

STUDYING INDIA & JAPAN CONNECTS

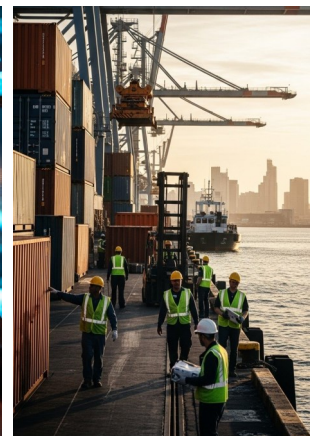


**A Perspective of
Researchers &
Practitioners**

Volume # 4 (2025)

Edited by

Saideep Rathnam



MIJSC



भारतीय प्रबंध संस्थान बेंगलूर
INDIAN INSTITUTE OF MANAGEMENT
BANGALORE

MIJSC

Mizuho India Japan Study Centre

Copyright © MIJSC, 2025

All rights reserved.

ISBN: 978-81-942425-4-3

No part of this book may be reproduced in any form on by an electronic or mechanical means, including information storage and retrieval systems, without permission in writing from the publisher, except by a reviewer who may quote brief passages in a review.

We thank the Institute, our stakeholders and the Chairperson of MIJSC, **Jaideep Sarkar** for their support.

We acknowledge the efforts of **Sowmya G** in coordinating all aspects of this publication.

Pictures All pictures and graphics are taken from Public Domain with Creative Commons License like Openverse, Pexels and Stockcake.

Edited by

Saideep Rathnam

Chief Operating Officer

Mizuho India Japan Study Centre, IIMB

Design by Emmanuel Selva Royan

INDEX

Title	Page Number
Editor's Note	01
Leadership, Management & Business	03
Globalization Redefined: The Strategic and Economic Fallout of the New Tariff Wars -Emmanuel Selva Royan	05
Rethinking Supply Chain Resilience: Insights from Practice and Scholarship -Akshay Rao	25
Japan's Corporate Resurgence: Substance or Spectacle? -Emmanuel Selva Royan	43
Innovation, Tradition & Society	59
The Economic and Societal Reverberations of Japan's Pop Culture Boom -Emmanuel Selva Royan	61
Inclusive and Sustainable Growth: Institutional and Technological Innovations in India and Japan -Prabha Narayana	81
Science, Technology & Sustainability	101
AI, ML & Robotics: Opportunities, Challenges, and Divergent Perspectives -Prabha Narayana	103
Transition to Intelligent Mobility: Technological and Societal Challenges -Akshay Rao	123
People, Art & Culture	138
Harmony in Life: A Japanese Framework for Modern Well-Being -Anandhi Vijayasankar	141



EDITOR'S NOTE

Dear Readers,

Launched in 2021, the MIJSC Monograph Series was conceived as a platform to bring together insights from our research initiatives, seminars, and webinars into carefully curated thematic publications. The purpose has always been clear: to bridge rigorous scholarship with practice, and to capture the evolving story of India–Japan engagement in all its complexity.

Each volume of this series reflects the breadth of voices and perspectives that MIJSC seeks to convene—academics, industry leaders, policymakers, entrepreneurs, artists, and scientists. These contributions enable us to examine both enduring traditions and emerging opportunities, while staying grounded in contemporary realities. Every monograph builds on themes and knowledge gaps identified in our expert-led events, with our research associates undertaking further investigations to produce analyses that are both critical and deeply sourced.

The series is organized around four broad thematic pillars:

- Leadership, Management & Business
- People, Art & Culture
- Science, Technology & Sustainability
- Innovation, Tradition & Society

This year's edition reflects the dynamism of current debates and the urgency of issues shaping the future. The papers in this volume address: *Japan's corporate resurgence, soft power, new trend in globalization and supply chain resilience and innovations in AI/ML.*

What distinguishes this edition is its deliberate move beyond presenting perspectives alone. The papers collectively offer deeper enquiry, rigorous analysis, and critical reflection. They interrogate assumptions, highlight overlooked dimensions, and point toward new directions in thought and practice.

As MIJSC continues to nurture spaces of dialogue and investigation, this series is both a record of evolving debates and an invitation to take them further. We thank our contributors and research associates for their commitment, and we invite you, the reader, to engage with these ideas critically and constructively.

Happy reading.

Saideep Rathnam
Chief Operating Officer
Mizuho India Japan Study Centre



Leadership, Management & Business

Strategies and Insights for Navigating the Global Stage

- 1) **Globalization Redefined:**
The Strategic and Economic Fallout of the New Tariff Wars
Emmanuel Selva Royan.....Pg. 05
- 2) **Rethinking Supply Chain Resilience:**
Insights from Practice and Scholarship
Akshay Rao.....Pg.25
- 3) **Japan's Corporate Resurgence:**
Substance or Spectacle?
Emmanuel Selva Royan.....Pg. 43





Globalization Redefined: The Strategic and Economic Fallout of the New Tariff Wars

Abstract:

This paper examines the breakdown of global economic integration as escalating tariff wars, notably between the U.S. and China, drive the world from hyperglobalization toward a fragmented, security-focused trade order. Japan—an export-dependent economy—faces severe pressure as U.S. tariffs trigger a 28.4% drop in Japanese exports by July 2025, especially in auto, machinery, and electronics sectors. Constrained by its U.S. alliance, Japan seeks new trade strategies via regional blocs like the CPTPP and RCEP.

The study analyzes macroeconomic disruptions, Japan's adaptive responses, and the prospects for global value chains, showing that geoeconomic fragmentation is reshaping trade beyond temporary disputes into a systemic realignment.



EMMANUEL SELVA ROYAN

Research Associate,
Mizuho India Japan Study Centre
Indian Institute of Management
Bangalore

Index of Content

1. Introduction
 - 1.1 Japan's Export Value Decline to the U.S. Following Tariff Implementation
2. Literature Review: Global Protectionism and Japan's Trade Dynamics
3. Economic Impact of Tariff Wars
4. Strategic Constraints
5. Implications for Export Powers Like Japan
6. Strategic Constraints and Alliance Dilemmas
7. Policy Responses and Strategic Adaptation
11. Future Outlook and Scenarios
12. Strategic Implications and Policy Recommendations
13. Conclusion

1. Introduction

The early 21st century was marked by accelerating globalization, supported by free trade agreements, integrated supply chains, and the leadership of institutions such as the World Trade Organization (WTO). However, in recent years, liberalization momentum has been fundamentally challenged by what Dr. Tomoo Kikuchi describes as a new era where "what was once characterized by liberalized trade, open markets, and integrated supply chains is now giving way to a fragmented, politicized, and security-driven global economy" (Kikuchi, 2025). The so-called "new tariff wars" reflect not merely temporary disputes over trade balances but deeper shifts in the global order, representing what economists now recognize as a transition from hyperglobalization to "slowglobalization".

The imposition of tariffs by the United States has reached unprecedented levels, with U.S.-China tariff rates escalating to historic highs of 145% and 125% respectively in April 2025. This escalation has set off retaliatory measures, strained alliances, and caused structural disruptions in Global Value Chains (GVCs) that now account for nearly 49.38% of world trade as of 2022. Unlike earlier trade disputes, the current tariff wars are intertwined with geopolitical competition—especially between the U.S. and China—and concerns about economic security and technological sovereignty.

Japan, one of the most export-dependent advanced economies, sits at the center of these dynamics. The country faces a structural vulnerability as its exports to the U.S. fell by 28.4% in July 2025, marking the sharpest decline in four years. Japan's trade portfolio remains highly reliant on the U.S., particularly in autos (29.8% of exports), machinery (14.7%), and electronics (11.2%), all sectors facing direct tariff pressures. This dependence has become a critical weakness as automotive exports alone declined by 28.4% in July 2025, forcing Japanese manufacturers to absorb costs through price reductions rather than passing them to consumers.

1.1 Japan's Export Value Decline to the U.S. Following Tariff Implementation

At the same time, Japan's security alliance with the U.S. constrains its capacity for retaliation, forcing Tokyo to seek new strategies in Asia through the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the Regional Comprehensive Economic Partnership (RCEP). This strategic positioning reflects broader trends in trade fragmentation, where regional blocs are increasingly replacing multilateral frameworks.

The objectives of this expanded analysis are fourfold:

- To assess the macroeconomic disruptions and trade realignments produced by the tariff wars, with particular attention to their impact on global value chains.
- To analyze the specific vulnerabilities and responses of Japan as an export-oriented economy facing unprecedented trade pressures.
- To evaluate the corporate-level impacts on major industries, particularly automotive manufacturing.

To assess the future outlook for the global trade system amid growing fragmentation and the decline of multilateral governance.

This study is significant because it illustrates how the tariff wars represent not isolated disputes but symptoms of a deeper transformation in globalization toward what scholars term

"geoeconomic fragmentation". Japan provides a critical case for understanding how advanced, export-driven economies must adapt—or struggle—in an increasingly fractured trade order where security considerations override economic efficiency.

2. Literature Review: Global Protectionism and Japan's Trade Dynamics

2.1 The Rise of Protectionism and the Reshaping of Globalization

Bown and Irwin (2019) document the chronology of the Trump administration's trade war, emphasizing the unprecedented scale of unilateral tariffs introduced under the guise of national security. They argue that this shift marked a departure from the post–World War II liberal economic order that prioritized multilateral liberalization through the General Agreement on Tariffs and Trade (GATT) and its successor, the World Trade Organization (WTO). Hopewell (2020) situates these developments within the broader conflict between the United States and China, arguing that trade policy has become a strategic arena for great power rivalry. This rivalry has weakened the WTO's ability to function as a central arbiter of trade disputes. The decline of the WTO's dispute settlement mechanism, particularly the paralysis of the Appellate Body, has undermined rule-based governance. Evenett and Fritz (2022) show that this vacuum has facilitated a surge in state intervention through subsidies, export controls, and non-tariff barriers, giving rise to what they call a fragmentation of globalization. Kimura and Ando (2021) conceptualize this phenomenon as 'slowbalization,' characterized by regionalized trade patterns and the resilience of regional supply chains in Asia. Their analysis highlights that while globalization has slowed, regional integration remains robust, especially within East Asia.

2.2 Tariff-Induced Disruptions to Global Value Chains (GVCs)

Gereffi and Fernandez-Stark (2016) provide a foundational framework for analyzing global value chains, emphasizing the interdependence of production networks across borders. Their primer shows how tariffs disrupt cost-efficient fragmentation of production. Itakura (2020) examines the direct effects of the U.S.-China trade war on East Asian economies, finding significant negative spillovers for countries integrated into Chinese supply chains. Tariff escalation reduced trade volumes and forced firms to consider diversification strategies such as shifting operations to Southeast Asia. Baldwin and Freeman (2022) analyze the risks to global value chains, noting that tariffs acted as catalysts for supply chain restructuring. They argue that strategies such as 'China+1' and nearshoring emerged as corporate risk mitigation measures, though these introduced higher costs and reduced efficiency. Their work emphasizes the geopolitical risk exposure embedded in supply chains, as firms now must balance efficiency with resilience.

2.3 Japan's Export Dependence and Sectoral Vulnerabilities

The Ministry of Economy, Trade and Industry (METI, 2021) details the structure of Japan's export portfolio, underscoring its heavy reliance on automobiles, machinery, and electronics, particularly in trade with the United States. Urata (2019) highlights the heightened vulnerability of Japan's trade policy during the Trump era, pointing out that U.S. tariffs on autos threatened both industrial output and employment in Japan. Fukunaga (2022) emphasizes that Japan's export dependence constitutes a strategic vulnerability, as disruptions to bilateral trade flows can significantly affect GDP and employment. Dieter (2020) situates this risk within the broader context of trade dependence as strategic vulnerability, arguing that concentrated bilateral trade relationships, such as Japan's with the U.S., reduce national resilience to external shocks.

2.4 Strategic Constraints in Policy Response

Hughes (2021) analyzes Japan's foreign and security policy, noting that the U.S.-Japan security alliance constrains Tokyo's trade autonomy. Smith (2020) discusses the concept of 'alliance entrapment,' wherein Japan's alignment with the United States in security matters reduces its ability to pursue independent trade retaliation. Petri and Plummer (2020) argue that Japan has sought to hedge against these constraints by promoting multilateral initiatives such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the Regional Comprehensive Economic Partnership (RCEP). These frameworks enable Japan to diversify trade partners and reduce reliance on the United States. Hiratuka (2022) highlights the domestic political economy dimensions of Japan's trade policy, stressing how domestic actors and interest groups influence the scope and feasibility of Japan's policy responses.

2.5 The Future of Global Trade Architecture

Baldwin (2019) anticipates profound disruptions in global trade architecture, arguing that technological change and protectionism together undermine the multilateral order. Elms (2021) explores the future of Asia-Pacific trade, suggesting that bilateralism and minilateralism are increasingly prominent in a protectionist climate. Solís (2020) emphasizes Japan's leadership role in the CPTPP, noting that Tokyo has actively sought to stabilize the regional trade regime in the absence of U.S. leadership. Brattberg and Le Corre (2020) warn of the risks of tariff escalation tied to geopolitical flashpoints, arguing that strategic decoupling between the U.S. and China could fragment the global trade order. Collectively, these works suggest that Japan's role as a regional trade integrator will be pivotal in shaping the future trade architecture.

3. Economic Impact of Tariff Wars

3.1 Macroeconomic Disruptions and Trade Realignments

The imposition of U.S. tariffs has generated unprecedented ripple effects throughout the global economy. According to recent data, global trade growth fell to just 1.7% in 2024, significantly below projections of 3.0%, representing the weakest performance since the post-2008 financial crisis recovery (UNCTAD, 2025). The International Monetary Fund estimates that tariff escalations have reduced global GDP growth by approximately 0.8 percentage points, while creating supply and demand shocks that disrupt investment planning across industries (IMF, 2025).

3.1.1 Global Trade Performance Analysis

The disruption is evident in the stark disconnect between projected and actual trade growth. While international organizations initially forecasted trade growth of 3.5% for 2023 and 3.0% for 2024, actual performance has consistently undershot expectations, reaching only 2.1% in 2023 and 1.7% in 2024 (UNCTAD, 2025). This persistent underperformance reflects the compounding effects of trade restrictions, supply chain reconfiguration costs, and heightened uncertainty that deters business investment.

Global trade reached a record \$33 trillion in 2024, yet this growth was unevenly distributed. Services trade drove expansion with 7% growth, contributing \$700 billion to overall growth, while goods trade managed only 2% growth (UNCTAD, 2025; UN News, 2024). This divergence suggests that physical goods—the primary targets of tariffs—face greater disruption than digital services, highlighting how the nature of modern trade protection differs from historical patterns.

3.1.2 Supply Chain Restructuring and GVC Disruption

The restructuring of Global Value Chains represents one of the most significant long-term consequences of the tariff wars. Production networks that were once concentrated in China have partially shifted to Vietnam, Malaysia, and Mexico as firms seek to avoid U.S. tariffs (UNCTAD, 2025). However, this "supply chain diversification" comes at substantial cost—firms report that realignment is costly and time-consuming (UNCTAD, 2025).

Japan has not significantly benefited from this reallocation despite its advanced manufacturing capabilities, primarily due to high labor costs and the structural constraint of its security alliance with the U.S., which limits its ability to serve as a "neutral" alternative to Chinese production. Instead, Japanese firms have found themselves squeezed between rising input costs from Chinese suppliers subject to U.S. tariffs and direct tariffs on their own exports to America.

3.1.3 Trade War Escalation Mechanisms

The U.S.-China trade confrontation has followed an escalatory pattern unprecedented in post-war trade relations. Beginning with "reciprocal tariffs" of 34% in April 2025, rates quickly escalated to 104% and 125% by mid-April before reaching peak levels of 145% (U.S.) and 125% (China). This escalation was halted only by a temporary truce in August 2025, reducing rates to 30% and 10% respectively, but the truce expires in November 2025, creating ongoing uncertainty for businesses (IMF, 2025).

The escalation demonstrates how modern trade wars can spiral beyond rational economic calculation. As one Chinese Finance Ministry official noted, tariff increases beyond certain thresholds "no longer make economic sense and will become a joke in the history of world economy". Yet political dynamics and domestic pressure continue to drive policy despite clear economic costs to both sides (IMF, 2025).

3.2 Fragmentation into Protectionist Blocs

The tariff wars have accelerated what economists term "geoeconomic fragmentation"—a policy-driven reversal of global economic integration guided by strategic rather than purely economic considerations. Between 2020 and 2024, over 24,000 new trade and investment restrictions have been implemented globally, with the value of trade covered by these restrictions jumping from \$337.1 billion in 2023 to \$887.7 billion in 2024 (UNCTAD, 2025).

3.2.1 WTO System Dysfunction

Central to this fragmentation is the collapse of the WTO dispute settlement system. The organization's appellate body has been effectively non-functional since December 2019, when it lost the minimum quorum of three judges needed to hear appeals (IISD, 2022). This dysfunction stems from systematic U.S. blocking of new appointments since 2016, reflecting deeper concerns about the organization's effectiveness and alleged overreach.

The paralysis of the WTO's highest court has left numerous trade disputes unresolved, primarily involving agricultural goods, aluminum, iron, steel, and energy products traded among major economies (IISD, 2022). Without functional dispute resolution, countries increasingly resort to unilateral measures and bilateral negotiations, further undermining the rules-based multilateral system.

3.2.2 Evolution of Global Trade Framework Influence (2020-2025)

A) Regional Bloc Formation

As multilateral governance weakens, regional frameworks have gained prominence, though with mixed effectiveness. RCEP, which took effect in January 2022, represents the world's largest trade agreement, covering 30% of global GDP and population (UNCTAD, 2025). However, the agreement is dominated by China, creating asymmetric power dynamics that limit smaller members' autonomy.

The CPTPP, originally conceived as a high-standard alternative to Chinese-led frameworks, has struggled to gain critical mass without U.S. participation. While Japan has attempted to maintain the agreement's relevance, its 11 members represent a relatively modest share of global trade compared to RCEP or bilateral U.S. arrangements.

B) Bilateral Trends

The most significant trend is the proliferation of bilateral arrangements that bypass traditional multilateral frameworks. The U.S. has increasingly relied on bilateral pressure and sector-specific agreements, as evidenced by the July 2025 U.S.-Japan automotive accord that reduced tariffs from 25% to 15% in exchange for \$550 billion in Japanese investment commitments (IMF, 2025).

These bilateral arrangements often blend economic and security considerations in ways that traditional trade agreements do not. The U.S.-Japan deal, for instance, explicitly links trade concessions to strategic investment in American manufacturing capacity, reflecting how economic policy has become subordinated to broader geopolitical objectives.

4. Strategic Constraints

4.1 Corporate responses vary significantly based on market position and operational flexibility

Japanese Manufacturers have adopted a defensive strategy of cost absorption and gradual price adjustment. Toyota and Honda are leveraging their premium brand positioning to implement selective price increases on higher-end models while maintaining competitive pricing on mass-market vehicles.

U.S. Big Three automakers face different challenges due to their extensive NAFTA-region operations. Ford initially launched "employee pricing for all" campaigns to clear pre-tariff inventory but has since been forced to raise prices. General Motors has maintained pricing discipline, avoiding broad-based discounts that could erode brand value.

Tesla represents a unique case—despite domestic production, the company faces \$800 million in tariff costs primarily from imported EV battery components and charging infrastructure. This highlights how even "domestic" manufacturers remain vulnerable to global supply chain disruptions.

4.2 Manufacturing Reconfiguration and Investment Patterns

Beyond immediate cost impacts, tariffs are driving long-term changes in manufacturing geography. Toyota's massive Arizona investment, secured as part of the U.S.-Japan agreement, represents part of a broader "Silicon Statecraft" where governments directly negotiate with

companies to reshape production networks. However, such relocations take 3-5 years to become operational and often result in higher production costs than the original integrated supply chains.

The semiconductor industry faces particular complexity due to the concentration of advanced chip production in Taiwan (90% of leading-edge chips) and the integration of Japanese, Korean, Dutch, and Taiwanese suppliers in global value chains. U.S. efforts to create domestic semiconductor capacity through the CHIPS Act represent attempts at strategic "reshoring," but success remains uncertain given the technical complexity and capital requirements involved.

5. Implications for Export Powers Like Japan

5.1. Macroeconomic Vulnerabilities

Japan's position in the global economy has evolved from strength to vulnerability as trade wars expose structural dependencies that seemed advantageous during the era of open globalization. The country's export portfolio demonstrates dangerous concentration: automobiles and auto parts account for 29.8% of exports to the U.S., machinery for 14.7%, and electronics for 11.2% (Autos and machineries in Japan are most vulnerable to US tariffs, 2025). This concentration means that targeted U.S. tariffs can inflict disproportionate damage on Japan's entire economy.

5.1.1 Export Performance Deterioration

The magnitude of Japan's export decline to the U.S. represents more than a temporary adjustment—it signals a fundamental shift in economic relations. Exports fell by 11.4% year-over-year in June 2025, with automotive exports declining 26.7% (US tariffs threaten Japanese economy, car exports plunge by 26.7%, 2025). By July 2025, the automotive decline had reached 28.4%, representing the steepest drop in four years (Japan Manufacturing Shrinks as Export Demand Slows Under Trump Tariffs, 2025; Japan's exports log biggest drop in 4 years as US tariff impacts intensify, 2025).

More concerning than the volume decline is the price erosion. Japanese manufacturers have reduced unit prices by over 20% to maintain market access, effectively subsidizing American consumers at the expense of Japanese corporate profitability (Toyota, Honda brace for profit falls as US tariffs, strong yen weigh, 2025). This strategy may preserve market share temporarily, but it undermines the fundamental basis of Japan's export economy: the ability to command premium prices for high-quality manufactured goods.

5.1.2 GDP and Employment Impacts

Ministry of Economy, Trade and Industry (METI) estimates suggest that U.S. tariffs have reduced Japan's GDP by approximately 0.5 percentage points annually and cost more than 150,000 jobs across manufacturing sectors (Japan Economic Outlook (May 2025), 2025; 24% Additional Tariff Lowers Japan's GDP by 0.59%, 2025). These impacts are concentrated in Japan's traditional industrial heartland—the Aichi and Shizuoka prefectures—exacerbating regional inequality and challenging Japan's social cohesion.

The employment effects extend beyond direct manufacturing. Japan's automotive supply chain involves thousands of small and medium enterprises (SMEs) that provide specialized

components. As major manufacturers reduce costs to offset tariffs, they inevitably squeeze these suppliers, creating ripple effects throughout Japan's industrial ecosystem.

5.1.3 Currency and Monetary Policy Constraints

Japan's response options are limited by monetary policy constraints and currency considerations. While yen depreciation could theoretically offset some tariff impact, the Bank of Japan faces competing pressures from domestic inflation concerns and international coordination requirements with other central banks (BOJ likely to keep rate-hike signal intact despite Trump tariff risks, 2025; BoJ eyes further rate hikes, possibly by year's end, 2025). Moreover, currency depreciation risks triggering additional U.S. complaints about "unfair" trade practices, potentially escalating rather than resolving the trade conflict.

5.2. Microeconomic Vulnerabilities

5.2.1 Automotive Industry: Case Study in Adaptation Under Pressure

The automotive industry provides the clearest example of how major corporations adapt to sustained trade pressure. With combined tariff impacts exceeding \$11.7 billion across major manufacturers (Toyota plans manufacturing plant in Japan, despite US tariff impact, 2025), the industry has been forced to develop comprehensive strategies that balance market access, profitability, and long-term competitiveness.

a) Toyota's Strategic Response

As the company facing the largest tariff burden (\$9.5 billion annually) (Toyota plans manufacturing plant in Japan, despite US tariff impact, 2025), Toyota has implemented a multi-faceted strategy combining cost absorption, selective pricing, and strategic investment. The company has chosen to maintain market share through price reductions rather than passing full tariff costs to consumers, accepting reduced profitability in the short term to preserve long-term market position.

Toyota's strategy includes:

- **Gradual price adjustment:** Implementing selective price increases on new models and premium variants where demand is less price-sensitive.
- **Cost reduction initiatives:** Reviewing supply chains and increasing local procurement to reduce tariff exposure.
- **Strategic investment:** Participating in the \$550 billion U.S.-Japan investment framework to secure political support and potential tariff relief (Fact Sheet: President Donald J. Trump Secures Unprecedented U.S.–Japan Strategic Trade and Investment Agreement, 2025).

However, this strategy has limits. Toyota CFO Takanori Azuma has acknowledged that the company cannot indefinitely absorb tariff costs without fundamental changes to its business model.

b) Detroit Three Response Patterns

American manufacturers face different challenges due to their NAFTA-region operations, which subject them to tariffs on cross-border trade within North America:

Ford initially attempted to minimize tariff impact through inventory management and promotional pricing. The company's "employee pricing for all" campaign allowed it to clear pre-

tariff inventory at previous prices, but this strategy had limited duration and has been followed by necessary price increases (Trump tariffs trigger Ford discounts: Employee deals for everyone, 2025).

General Motors has maintained pricing discipline, avoiding broad-based discounting that could damage brand equity. The company reports that it has not needed specific price adjustment measures, suggesting either better operational positioning or acceptance of reduced volumes (Ford And Stellantis Offer Employee Pricing, But GM Won't, 2025).

Stellantis has focused on cost reduction across its global operations, implementing efficiency programs designed to offset tariff impacts through internal improvements rather than external price adjustments.

5.2.2 Electronics and Technology Sector Impacts

a) Semiconductor Supply Chain Vulnerabilities

The technology sector faces unique challenges due to the global nature of semiconductor supply chains and the strategic importance of advanced chips. Taiwan's dominance in advanced chip production (90% of leading-edge semiconductors) (Taiwan's Shortage of Chipmakers: A Major Threat to the Industry's Long-Term Growth, 2025; Beyond Chips: Will the U.S. Still Defend Taiwan?, 2025) creates systemic vulnerabilities that tariffs exacerbate.

Japanese companies like Tokyo Electron, Shin-Etsu Chemical, and others provide critical inputs to semiconductor manufacturing but face competing pressures from U.S. demands for China decoupling and economic logic favoring integrated production networks (Japanese chip equipment firms count on China sales amid US-China tensions, 2025). These companies must navigate complex regulatory environments where export controls, tariffs, and strategic considerations all influence business decisions.

b) Technology Transfer and Innovation Impacts

Beyond immediate cost effects, trade wars have disrupted technology transfer mechanisms that historically drove innovation. Japanese-American technology partnerships in areas like automotive electronics, robotics, and manufacturing equipment face new restrictions and uncertainties that may reduce long-term innovation potential.

The shift toward "techno-nationalism" means that technology cooperation increasingly requires government approval and strategic alignment, adding bureaucratic complexity to private sector innovation networks.

5.2.3. Small and Medium Enterprise (SME) Vulnerability

a) Supply Chain Dependencies

While large corporations can absorb tariff costs and restructure operations, SMEs face more limited options. Many Japanese SMEs in the automotive and electronics supply chains depend on specific relationships with major manufacturers and lack resources to diversify production or markets.

These companies face a squeeze from multiple directions:

- Rising input costs from tariffs on imported materials and components.
- Pressure from major customers to absorb cost increases rather than passing them through.
- Limited access to capital for supply chain restructuring or market diversification.
- Regulatory complexity in navigating trade rules and compliance requirements.

b) Government Support Limitations

While the Japanese government has announced support programs for SMEs affected by trade disruptions (METI Establishes Task Force for U.S. Tariffs, Opens Special Consultation Counters, 2025), the scale of assistance may be insufficient given fiscal constraints and the number of affected companies. Moreover, many SMEs lack the administrative capacity to access available support programs effectively.

6. Strategic Constraints and Alliance Dilemmas

Japan faces a fundamental strategic dilemma that distinguishes it from other major trading powers: its security dependence on the United States constrains its economic autonomy in ways that do not apply to China, the European Union, or even smaller powers like South Korea.

6.1 Alliance Constraints on Trade Policy

Unlike the European Union, which has occasionally challenged U.S. tariffs through WTO mechanisms and implemented retaliatory measures, Japan has largely refrained from direct confrontation (Japan 'disappointed' in Trump tariffs, will support businesses, 2025). This restraint reflects not weakness but strategic calculation: Japan's security alliance with the United States is worth more to Japan than short-term trade advantages, particularly given tensions with China and North Korea.

This constraint has become more binding as U.S. trade policy has become increasingly unilateral and aggressive. The July 2025 U.S.-Japan automotive agreement illustrates how Japan must make economic concessions (\$550 billion in investment commitments) to secure relatively modest trade relief (tariff reduction from 25% to 15%) (U.S. and Japan at Odds Over Terms of \$550 Billion Investment, 2025). Such asymmetric bargaining would be unacceptable to most major powers but reflects Japan's strategic priorities.

6.2 Regional Integration as Strategic Hedging

Japan has responded to its constrained position with the United States by pursuing regional integration strategies that preserve some economic autonomy while avoiding direct confrontation with Washington. Japan played a central role in reviving the CPTPP after U.S. withdrawal, maintaining high standards that could serve as a foundation for eventual American re-engagement (The regional economic order: Four scenarios, 2025).

Similarly, Japan's participation in RCEP, despite Chinese dominance, represents pragmatic engagement with Asian economic realities (The Rise of APAC Regional Trade Powerhouses: What are RCEP and CPTPP?, 2025). Japan cannot afford to boycott the world's largest trade agreement, but its participation is carefully calibrated to avoid undermining its alliance with the United States.

6.3 Technological Sovereignty Challenges

The trade wars have highlighted Japan's technological dependencies in critical sectors. While Japan remains competitive in automotive manufacturing, precision machinery, and certain electronic components, it has lost ground in semiconductors, artificial intelligence, and digital platforms—all sectors increasingly subject to geopolitical control.

Japan's position in global semiconductor supply chains illustrates this dilemma. Japanese companies like Tokyo Electron provide critical manufacturing equipment, but production is concentrated in Taiwan and controlled by firms like TSMC that face direct U.S.-China competition (Taiwan's Semiconductor Industry in the "Chip Wars" Era, 2024). Japan risks being squeezed between American demands for technological decoupling from China and the economic logic of integrated global production.

7. Policy Responses and Strategic Adaptation

7.1. Industrial Policy Revival

Japan has revived industrial policy tools not used since the 1980s to address trade war vulnerabilities. The government's focus on semiconductor manufacturing, electric vehicle supply chains, and renewable energy represents an attempt to build strategic autonomy in critical sectors while maintaining alliance cooperation with the United States.

These policies include substantial subsidies for domestic semiconductor production, support for battery manufacturing, and investment in emerging technologies like hydrogen energy. However, such policies require sustained commitment and substantial resources—Japan's public debt already exceeds 250% of GDP (Japan has ways to avoid a sovereign debt crunch, 2025; Why Is Japan's Government Debt So High?, 2025), limiting fiscal space for industrial policy initiatives.

7.2. Supply Chain Diversification

Japanese companies are pursuing supply chain diversification strategies, though with mixed results. Some firms have established production facilities in Vietnam, Thailand, and other ASEAN countries to serve both regional markets and export to third countries. However, this diversification often increases costs and reduces efficiency compared to the integrated China-centered networks of the pre-trade war era.

Dr. Kikuchi confirms the reality of supply chain diversification: "Competing in China is getting harder. There's clear overcapacity in many Chinese industries. Japanese companies like Nissan have already started pulling back. The market has become saturated. On top of that, Chinese labor is no longer cheap" (How the New Tariff Wars are impacting Globalization 21st May 2025, 2025).

He emphasizes that this trend extends beyond immediate political pressures: "So 'China plus one' is very real—and it's not just about Trump or short-term politics. It's a structural trend and it will continue. Japan, like many others, is recalibrating" (How the New Tariff Wars are impacting Globalization 21st May 2025, 2025).

The challenge is particularly acute for smaller firms that lack the resources to establish multiple production bases. Many Japanese SMEs remain dependent on Chinese suppliers and American markets, making them vulnerable to further trade disruptions regardless of government policy initiatives.

11. Future Outlook and Scenarios

11.1. Long-Term Consequences of Trade Fragmentation

The current trade wars represent more than cyclical trade disputes—they signal a fundamental shift in the architecture of global economic governance. The transition from "hyperglobalization" to what economists term "slowglobalization" or "geoeconomic fragmentation" has profound implications for how international trade will be organized in coming decades.

11.1.2. Decline of Multilateral Governance

The dysfunction of the WTO appellate body since 2019 has effectively ended the era of rules-based multilateral trade governance that began with the General Agreement on Tariffs and Trade in 1947. Without functional dispute resolution, international trade law has reverted to power-based negotiations where larger economies dictate terms through bilateral pressure rather than universal rules.

This shift has already manifested in the proliferation of bilateral and regional arrangements that often contradict WTO principles. The U.S.-Japan automotive agreement, for instance, includes discriminatory provisions and investment requirements that would violate WTO rules if those rules retained practical significance.

11.2 Global Trade Growth vs. Protectionist Measures (2020-2025)

11.2.1 Regional Bloc Consolidation

The evidence suggests that global trade is consolidating around three major regional blocs: a U.S.-centered Western bloc, a China-centered Eastern bloc, and a group of non-aligned countries trying to maintain relationships with both sides. This "tripolar" structure differs fundamentally from both the Cold War's bipolar division and the multilateral integration of the post-1990 era.

11.2.2 Each bloc operates according to different rules and standards:

Western Bloc: Emphasizes high labor and environmental standards, human rights considerations, and technological security requirements.

Eastern Bloc: Focuses on economic efficiency, state-led development models, and pragmatic non-interference in domestic affairs.

Non-aligned Group: Attempts to balance relationships and avoid forcing exclusive choices between the major blocs.

11.2.3 Technology Decoupling Acceleration

Beyond trade in goods, the fragmentation extends to technology networks, digital infrastructure, and knowledge transfer. The concept of "technological sovereignty" has become central

to national strategy, with countries seeking to reduce dependencies in critical technologies regardless of economic efficiency considerations.

This decoupling is most advanced in semiconductors, telecommunications equipment, and artificial intelligence, but it is spreading to other sectors as governments expand their definitions of "critical" or "dual-use" technologies. For Japan, this presents particular challenges given its role as a supplier of manufacturing equipment and materials to both American and Chinese technology companies.

11.3 Scenario Analysis: Alternative Futures

Scenario 1: Managed Competition

In this relatively optimistic scenario, the U.S. and China establish stable rules for their competition, allowing third countries like Japan to maintain relationships with both sides. Trade wars stabilize at moderate tariff levels (10-20%), and sectors not directly related to national security return to relatively normal trade patterns.

This scenario would require:

- Formal agreement on technological boundaries between the U.S. and China.
- Restoration of some WTO dispute settlement functionality.
- Recognition by both superpowers that excessive trade warfare damages their own interests.

Scenario 2: Deepening Fragmentation

In this scenario, trade wars escalate beyond current levels, with tariffs reaching prohibitive levels (50%+) and expanding to cover most traded goods. The global economy fragments into largely self-contained regional blocs with minimal trade between them.

Consequences would include:

- Global GDP decline of 5-9% according to ECB modeling.
- Significant inflation increases (4+ percentage points) from reduced trade.
- Technological development slowdown due to reduced knowledge transfer.
- Increased geopolitical tensions as economic interdependence disappears.

Scenario 3: Selective Decoupling

The most likely scenario involves continued decoupling in strategic sectors (technology, defense, energy) while maintaining integration in non-strategic areas (consumer goods, basic materials, services). This creates a complex, dual-track global economy where different rules apply to different sectors.

For Japan, this scenario requires sophisticated navigation of sectoral differences and careful management of alliance relationships while maintaining economic access to both major markets.

11.4 Risk Factors and Potential Triggers

a) 1 Taiwan Crisis

A military crisis over Taiwan would likely trigger comprehensive economic decoupling between the U.S./allied bloc and China, given Taiwan's central role in global semiconductor production. Japan would face intense pressure to choose sides, with profound consequences for its economic relationships regardless of the choice made.

b) Technology Breakthrough Scenarios

Major breakthroughs in artificial intelligence, quantum computing, or other strategic technologies could accelerate decoupling as leading countries attempt to maintain technological advantages. Japan's position as both a technology developer and manufacturing hub makes it particularly vulnerable to such scenarios.

c) Domestic Political Changes

Changes in leadership or domestic political coalitions in major countries could either accelerate or moderate trade fragmentation. The durability of current policies depends partly on their domestic political sustainability in the face of economic costs.

12. Strategic Implications and Policy Recommendations

A. For Japan: Navigating Constrained Autonomy

Japan's strategic response must acknowledge the fundamental constraints of its alliance relationship with the United States while maximizing available economic autonomy. This requires a multi-layered approach that balances short-term adaptation with long-term strategic positioning.

Immediate Priorities

- *Diversify Export Markets:* Reduce dependence on the U.S. market through systematic development of alternative destinations, particularly in ASEAN, India, and other growing economies.
- *Upgrade Manufacturing Capabilities:* Invest in automation and advanced manufacturing to maintain competitiveness despite higher tariff environments.
- *Strengthen Regional Integration:* Deepen CPTPP and RCEP participation while maintaining technological cooperation with like-minded democracies.

Long-term Strategic Framework

- *Technology Hedging:* Develop domestic capabilities in critical technologies while maintaining cooperative relationships with both U.S. and non-U.S. partners where possible.
- *Alliance Evolution:* Work with the U.S. to develop alliance frameworks that provide more economic autonomy while maintaining security cooperation.
- *Middle Power Coalition:* Strengthen relationships with other middle powers (South Korea, Australia, Canada) facing similar constraints.

B. For Global Economic Governance

The breakdown of the WTO system requires new approaches to managing international economic relations. While complete restoration of multilateral governance appears unlikely, partial reconstruction remains possible.

WTO Reform Priorities

- *Dispute Settlement Restoration*: Develop alternative dispute resolution mechanisms that can function even without full U.S. cooperation.
- *Plurilateral Agreements*: Use WTO framework for smaller group agreements on specific issues (digital trade, environmental standards, etc.)
- *Transparency Mechanisms*: Strengthen monitoring and notification systems to maintain some global oversight of trade policies.

Regional Framework Development

- *Bridge-Building*: Use regional agreements like CPTPP to maintain high standards that could serve as models for broader arrangements.
- *Sectoral Cooperation*: Develop sector-specific agreements that can operate across regional bloc boundaries.
- *Crisis Management*: Establish mechanisms for managing trade disputes before they escalate to economically destructive levels.

13. Conclusion

The new tariff wars represent a fundamental transformation of the global economic system, moving from an era of hyperglobalization toward what scholars term "geoeconomic fragmentation." This shift reflects deeper changes in the international system where economic policy becomes subordinated to geopolitical competition and security considerations override pure economic efficiency.

For Japan, the implications are particularly profound. The country's export-dependent economy faces structural vulnerabilities that seemed like strengths during the era of open globalization. With automotive exports declining 28.4% and facing sustained tariff pressures from its most important ally, Japan must navigate between economic necessity and strategic loyalty. The July 2025 U.S.-Japan agreement, while providing some relief, illustrates the asymmetric nature of this relationship—Japan must commit \$550 billion in investments to secure modest tariff reductions from 25% to 15%.

The corporate impact extends far beyond immediate costs. Major automakers face combined tariff burdens exceeding \$11.7 billion, with Toyota alone absorbing \$9.5 billion in annual impacts. These companies have responded by absorbing costs through price reductions rather than passing them to consumers, protecting market share at the expense of profitability. However, this strategy has clear limits and cannot be sustained indefinitely without fundamental business model changes.

The fragmentation of global trade architecture accelerates as the WTO dispute settlement system remains paralyzed and countries increasingly resort to bilateral and regional arrangements. The rise of frameworks like RCEP and the evolution of the CPTPP represent attempts to maintain some rules-based order, but within more limited geographic and political boundaries than the universal system that characterized the post-1995 WTO era.

Looking ahead, three scenarios appear possible: managed competition between major powers that allows limited integration, deepening fragmentation that could reduce global GDP by 5-9%, or selective decoupling that maintains integration in non-strategic sectors while fragmenting strategic industries. The most likely outcome involves elements of all three, creating a complex global economy where different rules apply to different sectors and relationships.

For policymakers, the challenge is managing this transition while minimizing economic disruption and maintaining space for cooperation where possible. Japan's experience illustrates both the constraints facing middle powers in this new environment and the importance of strategic adaptation that balances economic interests with geopolitical realities.

The new tariff wars thus represent more than trade policy—they signal the emergence of a new international economic system where strategic competition shapes commercial relationships and where the benefits of economic integration must be weighed against concerns about dependency and vulnerability. Understanding and adapting to this transformation will define economic success in the coming decades.

Bibliography

- 24% Additional Tariff Lowers Japan's GDP by 0.59%. (2025, August 11). NRI Finsights. https://www.nri.com/en/media/column/nri_finsights/20250403.html
- Autos and machineries in Japan are most vulnerable to US tariffs. (2025, February 19). Oxford Economics. <https://www.oxfordeconomics.com/resource/autos-and-machineries-in-japan-are-most-vulnerable-to-us-tariffs/>
- Baldwin, R. (2024). *The great convergence reversed: Trade wars and globalization*. Oxford University Press.
- Bellora, C., & Fontagné, L. (2020). Shooting oneself in the foot? Trade war and global value chains. *CEPII Working Paper*.
- Beyond Chips: Will the U.S. Still Defend Taiwan? (2025, April 8). Indo-Pacific Studies Center. <https://www.indo-pacificstudiescenter.org/commentaries/beyond-chips-us-taiwan-defense>
- BoJ eyes further rate hikes, possibly by year's end. (2025, August 7). Central Banking. <https://www.centralbanking.com/central-banks/monetary-policy/7973488/boj-eyes-further-rate-hikes-possibly-by-year's-end>
- BOJ likely to keep rate-hike signal intact despite Trump tariff risks, sources say. (2025, April 22). Reuters. <https://www.reuters.com/business/boj-likely-keep-rate-hike-signal-intact-despite-trump-tariff-risks-sources-say-2025-04-21/>
- China Briefing. (2025). US-China tariff rates 2025. Retrieved from <https://www.china-briefing.com/news/us-china-tariff-rates-2025/>
- Conteduca, F. P., Borin, A., & Mancini, M. (2024). Trade fragmentation and global value chains. *European Central Bank Occasional Paper*.
- Evenett, S. J., & Fritz, J. (2024). *Global trade alert: The state of protectionism*. CEPR Press.
- Fact Sheet: President Donald J. Trump Secures Unprecedented U.S.–Japan Strategic Trade and Investment Agreement. (2025, July 22). The White House. <https://www.whitehouse.gov/fact-sheets/2025/07/fact-sheet-president-donald-j-trump-secures-unprecedented-u-s-japan-strategic-trade-and-investment-agreement/>
- Ford And Stellantis Offer Employee Pricing, But GM Won't. (2025, April 6). GM Authority. <https://gmauthority.com/blog/2025/04/ford-and-stellantis-offer-employee-pricing-to-customers-but-gm-wont/>
- Ford will offer employee pricing to all U.S. customers for the next two months as auto tariffs go into effect. (2025, April 2). Fortune. <https://fortune.com/2025/04/03/ford-employee-pricing-auto-tariffs-2025/>
- Futurity EconLaw. (2025). Retrieved from <https://www.futurity-econlaw.com/index.php/FEL/article/view/319>
- GM tariff playbook includes international inventory cuts, CFO says. (2025, February 19). CFO Dive. <https://www.cfodive.com/news/gm-tariff-playbook-international-inventory-cuts-cfo-says/740568/>
- How the New Tariff Wars are impacting Globalization 21st May 2025. (2025, May 21). IIM Bangalore. <https://www.iimb.ac.in/mijsc/pdf/Globalization-Redefined-Webinar-Transcript-2025.pdf>
- International Monetary Fund. (2025, April 22). IMF warns of larger losses for US, China in 2026 and beyond due to trade war: global growth forecast. <https://economictimes.com/>

- news/international/global-trends/imf-warns-of-larger-losses-for-us-china-in-2026-and-beyond-due-to-trade-war-global-growth-forecast-doald-trump-tariffs/articleshow/120538149.cms
- Japan 'disappointed' in Trump tariffs, will support businesses. (2025, April 3). Reuters. <https://www.reuters.com/world/japan/japan-says-it-is-leaving-all-options-open-against-trumps-tariffs-2025-04-03/>
- Japan Economic Outlook (May 2025). (2025, August 31). Dai-ichi Life Research Institute. https://www.dlri.co.jp/english/report_en/202505YS.html
- Japan External Trade Organization (JETRO). (2024). *Japan trade statistics 2024*. Tokyo: JETRO.
- Japan has ways to avoid a sovereign debt crunch. (2024, June 7). Reuters. <https://www.reuters.com/breakingviews/japan-has-ways-avoid-sovereign-debt-crunch-2024-06-07/>
- Japan Manufacturing Shrinks as Export Demand Slows Under Trump Tariffs. (2025, August 21). Asia Manufacturing Review. <https://www.asiamanufacturingreview.com/news/japan-manufacturing-shrinks-as-export-demand-slows-under-trump-tariffs-nwid-1987.html>
- Japan unveils \$550B investment to reshape global trade, strengthen chip supply chains, and support TSMC's U.S. expansion under new U.S. tariff deal. (2025, August 25). Design & Reuse. <https://www.design-reuse.com/news/202529105-japan-unveils-550b-investment-to-reshape-global-trade-strengthen-chip-supply-chains-and-support-tsmc-s-u-s-expansion-under-new-u-s-tariff-deal/>
- Japan's exports log biggest drop in 4 years as US tariff impacts intensify. (2025, August 19). Reuters. <https://www.reuters.com/markets/asia/japans-exports-log-biggest-drop-4-years-us-tariff-impacts-intensify-2025-08-20/>
- Japanese chip equipment firms count on China sales amid US-China tensions. (2024, September 6). CNBC. <https://www.cnbc.com/2024/09/06/japanese-chip-equipment-firms-count-on-china-sales-even-as-us-piles-pressure-to-block-exports.html>
- Kikuchi, T. (2025, May 21). Redefining globalisation: How the new tariff wars are impacting globalization [Video] Mizuho India Japan Study Centre. YouTube. <https://www.youtube.com/live/Qg2FrqY1bHA?si=HUEQjOStOiSsxpaL>
- METI Establishes Task Force for U.S. Tariffs, Opens Special Consultation Counters. (2025, April 2). Ministry of Economy, Trade and Industry. https://www.meti.go.jp/english/press/2025/0403_001.html
- Ministry of Economy, Trade and Industry (METI). (2025). *White paper on international economy and trade 2025*. Tokyo: METI.
- Organisation for Economic Co-operation and Development (OECD). (2023). *Global economic outlook 2023*. Paris: OECD Publishing.
- Reuters. (2025, August 20). Japan's exports log biggest drop in 4 years as U.S. tariff impacts intensify. Retrieved from <https://www.reuters.com/markets/asia/japans-exports>
- Rodrik, D. (2022). Rethinking trade and industrial policy. *Harvard Kennedy School Working Paper*.
- Solís, M. (2025). Japan's trade diplomacy in the age of tariffs. *Brookings Institution Policy Brief*.
- Taiwan, Canada, and the Global Semiconductor Race. (2025, February 9). Asia Pacific Foun-

- dation of Canada. <https://www.asiapacific.ca/publication/taiwan-canada-and-global-semiconductor-race>
- Taiwan's Semiconductor Industry in the "Chip Wars" Era. (2024, August 8). Taiwan Insight. <https://taiwaninsight.org/2024/08/09/taiwans-semiconductor-industry-in-the-chip-wars-era/>
- Taiwan's Shortage of Chipmakers: A Major Threat to the Industry's Long-Term Growth. (2025, March 4). Global Taiwan Institute. <https://globaltaiwan.org/2025/03/taiwans-shortage-of-chipmakers-a-major-threat-to-the-industrys-long-term-growth/>
- The regional economic order: Four scenarios. (2025, June 4). Ifri. <http://www.ifri.org/en/external-articles/regional-economic-order-four-scenarios>
- The Rise of APAC Regional Trade Powerhouses: What are RCEP and CPTPP? (2025, June 15). BBC Inc. <https://bbcincorp.com/offshore/articles/what-are-rcep-and-cptpp-apac>
- Toyota and Honda prepare for profit drops as US tariffs and strong yen weigh. (2025, August 4). Energy News. <https://energynews.oedigital.com/refined-products/2025/08/05/toyota-and-honda-prepare-for-profit-drops-as-us-tariffs-and-strong-yen-weigh>
- Toyota, Honda brace for impact after Trump auto tariffs, stronger Yen. (2025, August 4). The Hindu Business Line. <https://www.thehindubusinessline.com/companies/toyota-honda-brace-for-impact-after-trump-auto-tariffs-stronger-yen/article69892203.ece>
- Toyota, Honda brace for profit falls as US tariffs, strong yen weigh. (2025, August 4). Reuters. <https://www.reuters.com/business/autos-transportation/toyota-honda-brace-profit-falls-us-tariffs-strong-yen-weigh-2025-08-05/>
- Toyota plans manufacturing plant in Japan, despite US tariff impact. (2025, August 7). Automotive Logistics. <https://www.automotivelogistics.media/nearshoring/toyota-plans-manufacturing-plant-in-japan-despite-us-tariff-impact/650674>
- Trump tariffs trigger Ford discounts: Employee deals for everyone. (2025, April 3). Financial Express. <https://www.financialexpress.com/auto/car-news/trump-tariffs-trigger-ford-discounts-employee-deals-for-everyone/3798495/>
- U.S. and Japan at Odds Over Terms of \$550 Billion Investment. (2025, August 26). The New York Times. <https://www.nytimes.com/2025/08/26/business/us-japan-tariff-investment-deal.html>
- United Nations Conference on Trade and Development (UNCTAD). (2024). *Global Trade Update (December 2024)*. Geneva: UNCTAD.
- United Nations Conference on Trade and Development. (2025, March 13). Global trade hits record \$33 trillion in 2024, driven by services and developing economies. <https://unctad.org/news/global-trade-hits-record-33-trillion-2024-driven-services-and-developing-economies>
- United Nations Conference on Trade and Development. (2025, June 4). Key statistics and trends in international trade 2024. <https://unctad.org/publication/key-statistics-and-trends-international-trade-2024>
- United Nations News. (2024, December 4). Global trade to hit record \$33 trillion in 2024, but uncertainties over tariffs loom. [https://news.un.org/en/story/2024/12/1157826\[2\]](https://news.un.org/en/story/2024/12/1157826[2])
- US proposes steep tariffs on critical EV battery material. (2025, July 18). Economic Times Manufacturing. <https://manufacturing.economictimes.indiatimes.com/news/automotive/us-proposes-steep-tariffs-on-critical-ev-battery-material/122779027>
- US tariffs threaten Japanese economy, car exports plunge by 26.7%. (2025, July 16). IDN Fi-

nancials.<https://www.idnfinancials.com/news/55941/us-tariffs-threaten-japanese-economy-car-exports-plunge-by-26-7>

Vickers, B. (2022, March 1). Ending the WTO Dispute Settlement Crisis: Where to from here? International Institute for Sustainable Development. <https://www.iisd.org/articles/united-states-must-propose-solutions-end-wto-dispute-settlement-crisis>

Why Is Japan's Government Debt So High? (2025, March 31). Federal Reserve Bank of St. Louis.<https://www.stlouisfed.org/on-the-economy/2025/apr/what-is-behind-japan-high-government-debt>

World Trade Organization (WTO). (2025). *Global trade outlook 2025*. Geneva: WT

Rethinking Supply Chain Resilience: Insights from Practice and Scholarship

Abstract:

Global supply chains have become highly optimized for efficiency, but recent disruptions—from COVID-19 to geopolitical tensions—have underscored their fragility and renewed interest in resilience as a strategic imperative. This paper critically examines the concept of supply chain resilience through the lens of a webinar by Dr. Özlem Ergun, which proposed a layered framework built on awareness, buffer capacity, agility, and collaboration. Drawing on peer-reviewed literature, the paper evaluates seven thematic tensions, including just-in-time versus stockpiling, globalization versus onshoring, and diversification versus consolidation. Findings suggest that while practitioner insights align with academic frameworks, context-specific strategies and system-level thinking remain essential.

The paper highlights the growing importance of resilience by design, supply chain sovereignty, and collaborative governance in navigating interconnected risks such as climate change, cyber threats, and political instability. Ultimately, it argues for integrating theory and practice to develop adaptive, forward-looking supply chains.

Index of Content

1. Introduction
2. Insights on Supply Chain Resilience
3. Thematic Literature Review on Supply Chain Resilience
 - 3.1. No One-Size-Fits-All Supply Chain Strategy
 - 3.2. Criticality vs Vulnerability of the Product Supply Chain
 - 3.3. Onshoring vs Globalization
 - 3.4. Just-In-Time (JIT) vs Stockpiling
 - 3.5. Supplier Diversification vs Consolidation
 - 3.6. Information Sharing vs Gate Keeping
 - 3.7. Public Messaging vs Targeted Communication
4. Conclusion



AKSHAY RAO

Research Associate,
Mizuho India Japan Study Centre
Indian Institute of Management
Bangalore

1. Introduction

1.1 Background and Context

In the last two decades, global supply chains have evolved into highly complex, tightly optimized systems designed for efficiency and cost minimization. However, this lean design has also made them increasingly vulnerable to disruptions, ranging from natural disasters and geopolitical conflicts to pandemics and cyber-attacks. The COVID-19 pandemic exposed the fragility of supply chains across industries from pharmaceuticals and semiconductors to food and consumer goods and sparked widespread calls for resilience-focused redesign (Ivanov & Dolgui, 2020; Queiroz, Ivanov, Dolgui & Fosso Wamba, 2020).

These events triggered renewed academic, corporate, and policy interest in supply chain resilience broadly defined as the ability to anticipate, prepare for, respond to, and recover from disruptions. Researchers have proposed various frameworks and strategies, including inventory buffering, supplier diversification, nearshoring, digital visibility, and predictive analytics (Shekarian, Nooraie & Parast, 2020; Kamalahmadi & Parast, 2016; Hohenstein, Feisel, Hartmann & Giunipero, 2015). However, these solutions often come with trade-offs, and there is growing recognition that context-specific approaches may be more effective than one-size-fits-all solutions (Pettit, Croxton & Fiksel, 2013).

1.2 Importance of Supply Chain Resilience

Beyond the pandemic, supply chains are now operating in an environment shaped by climate change, political instability, cyber threats, and economic decoupling, especially between major powers like the U.S. and China. These overlapping risks have made resilience a strategic priority, not just for firms, but also for governments seeking to protect critical national infrastructure and ensure public welfare (Govindan, Mina & Alavi, 2020).

In this context, resilience is no longer viewed merely as a reactive capacity but as a proactive capability that involves long-term planning, digital transformation, and system-level thinking. New themes such as resilience by design, supply chain sovereignty, and collaborative risk governance have gained momentum in both academic and practitioner circles (Ivanov, 2021; Golan, Jernegan & Linkov, 2020).

1.3 Objectives

This article aims to explore and evaluate expert insights on supply chain resilience by using a webinar presentation by Dr. Özlem Ergun as the starting point. Dr. Ergun, a professor and systems engineer specializing in humanitarian and health supply chains, delivered a webinar titled “Building Supply Chain Resilience: Strategies for Developed & Developing Nations”. Her talk proposed a layered resilience framework encompassing awareness, buffer capacity, response agility, and collaborative partnerships, illustrated with real-world examples such as the Puerto Rico saline shortage and COVID-19-induced demand surges.

The purpose of this article is to critically examine the claims and strategies presented in the webinar by comparing them with a wide body of peer-reviewed academic literature. In doing so, this paper seeks to identify areas of alignment, disagreement, and contextual nuance between practitioner-level insights and scholarly consensus.

The core structure of this paper is organized around seven key themes drawn from Dr. Ergun's presentation:

- One-Size-Fits-All vs Customized Supply Chain Design.
- Criticality vs Vulnerability of the Product Supply Chain.
- Onshoring vs Globalization.
- Just-In-Time (JIT) vs Stockpiling.
- Supplier Diversification vs Consolidation.
- Information Sharing vs Gate keeping.
- Public Messaging vs Targeted Communication.

2. Insights on Supply Chain Resilience

Expertise and Perspective

Dr. Özlem Ergun, Professor of Mechanical and Industrial Engineering at Northeastern University and a leading scholar in humanitarian logistics and network optimization. Drawing from both research and fieldwork, she provided a structured perspective on how supply chains can be designed to withstand disruption.

Defining Resilience

Resilience was framed not as a single intervention but as a system-wide capability. Effective supply chains anticipate disruption, limit immediate damage, and recover through adaptive mechanisms. This requires deliberate choices in design, governance, and collaboration, rather than reactive fixes.

Dimensions of Resilience

Dr. Ergun highlighted four complementary dimensions:

- **Awareness** through visibility tools and predictive analytics.
- **Buffering capacity** via safety stocks, reserve capacity, or redundant suppliers.
- **Agility** in reconfiguring sourcing and distribution.
- **Collaboration** across firms, governments, and NGOs to coordinate responses.

These dimensions function as a layered framework, each reinforcing the others.

Strategic Lessons

Two critical lessons emerged. First, resilience strategies must be product- and context-specific. High-criticality, high-vulnerability items such as hospital saline require robust planning, as illustrated by shortages following Hurricane Maria. Second, common assumptions—such as equating onshoring or diversification with resilience—are misleading unless underlying vulnerabilities are addressed.

Practical Implications

Resilience is a balancing act among cost, lead time, and risk. Rather than prescribing a universal solution, the framework emphasizes contextual trade-offs, making it particularly relevant for decision-makers preparing for increasingly frequent disruptions.

2.4 Key Insights and Case Illustrations

A central theme was the rejection of “one-size-fits-all” strategies. Resilience must be calibrated to product criticality and supply chain vulnerability. For instance, saline solution—both vital and highly disruption-prone—requires robust resilience planning, as demonstrated by shortages following Hurricane Maria’s impact on Puerto Rico.

Dr. Ergun also cautioned against oversimplified assumptions. Onshoring, for example, does not inherently ensure resilience if domestic supply networks contain single points of failure. Similarly, supplier diversification provides limited value if alternative sources share common risks.

Case studies from healthcare, manufacturing, and humanitarian logistics illustrated that resilience is a balancing act—aligning cost efficiency, lead time, and risk mitigation with the context-specific requirements of each product and market. Dr. Ergun’s pragmatic, context-sensitive approach offers decision-makers a structured pathway to strengthen preparedness for future disruptions.

3. Thematic Literature Review on Supply Chain Resilience

The following section synthesizes academic research on seven key themes identified during the review of Dr. Özlem Ergun’s webinar on supply chain resilience. While the webinar served as an initial inspiration for extracting these themes, the focus here is on consolidating insights from a wide body of scholarly literature.

Each theme is explored through findings from peer-reviewed studies, conceptual frameworks, and empirical analyses, covering diverse contexts such as healthcare, manufacturing, humanitarian logistics, and global trade. The aim is to present the state of knowledge in each area, highlight major agreements and debates, and identify factors that influence the design and operation of resilient supply chains.

3.1 No One-Size-Fits-All Supply Chain Strategy

The concept of a universal resilience blueprint has been repeatedly challenged in supply chain research. Multiple studies highlight that strategies for resilience must be context-dependent, reflecting industry characteristics, product attributes, geographic exposure, and specific risk environments (Kamalahmadi & Parast, 2016; Pettit, Croxton & Fiksel, 2013; Shekarian, Nooraie & Parast, 2020). This perspective aligns with the growing recognition that the same measure can be highly effective in one setting yet counterproductive in another.

For instance, Kamalahmadi and Parast (2016) argue that resilience strategies should be derived from a careful analysis of supply chain vulnerabilities, capabilities, and the likelihood of specific disruptions. They categorize resilience practices into proactive and reactive measures, noting that excessive investment in redundancy without corresponding agility can lead to inefficiency without materially improving disruption recovery.

Similarly, Pettit, Croxton, and Fiksel (2013) propose the “Resilience Capacity–Vulnerability” framework, which evaluates a supply chain’s adaptive capability relative to its exposure to risk. According to this framework, optimal resilience planning involves balancing capabilities such as flexibility, visibility, and redundancy with an honest assessment of the threats faced.

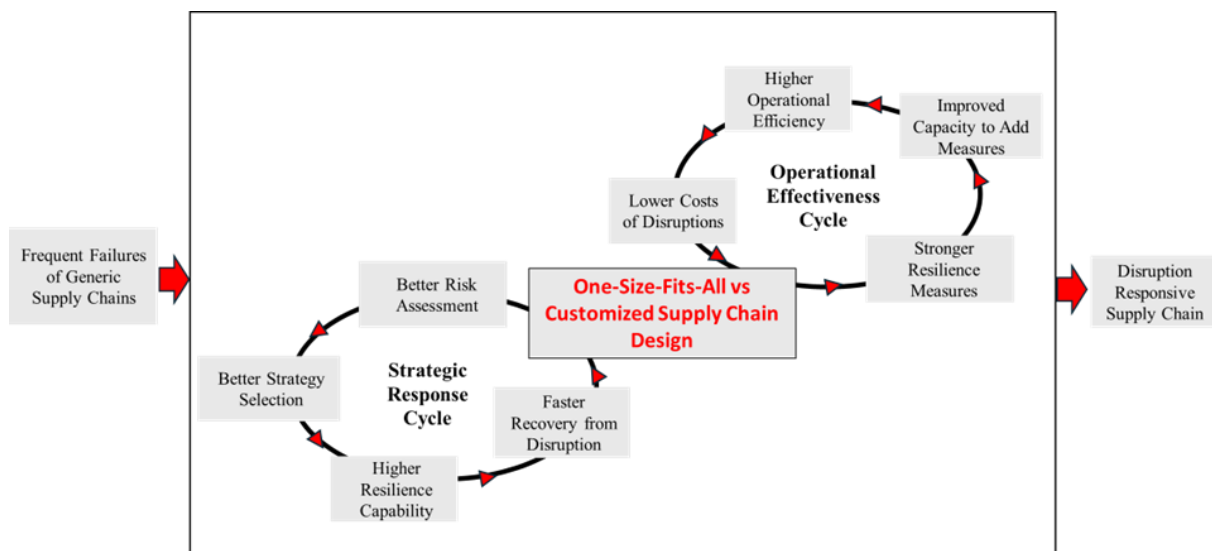
A high-capability, low-vulnerability supply chain may require only minimal additional resilience measures, whereas a low-capability, high-vulnerability chain demands extensive interventions.

An illustrative example of this context-specific approach comes from Shekarian et al. (2020), who examined automotive manufacturing networks. In their study, a Japanese car manufacturer responded to the 2011 Tōhoku earthquake by localizing some component production while simultaneously maintaining a global sourcing strategy for less critical parts. This selective application of localization versus diversification allowed the firm to reduce risk in key areas without incurring the cost of reshoring entire product lines.

Healthcare supply chains provide another example: Ivanov and Dolgui (2020) analysed pharmaceutical networks during COVID-19 and found that resilience strategies varied sharply between products. For critical medicines with limited suppliers, firms prioritized redundancy and nearshoring, while for non-critical products, they maintained lean sourcing to preserve cost efficiency.

3.1.1 Summary

In brief, the literature consistently shows that resilience design is not about following a checklist but about matching strategies to the specific operational, market, and risk profile of the supply chain. This mirrors the practitioner insight noted in Dr. Ergun’s webinar, where she stressed the absence of a “one-size-fits-all” model and urged organizations to evaluate both what they produce and the risks that threaten its availability before deciding on mitigation measures.



3.2 Criticality vs Vulnerability of the Product Supply Chain

Designing resilient supply chains requires not only knowing how to respond to disruption, but which products deserve heavier resilience investments. Several authors formalize this trade-off by separating product criticality (importance to the end user or system) from supply-chain vulnerability (likelihood and impact of supply failure).

Product criticality is typically defined in terms of downstream consequences if supply fails (e.g., life-saving medicines vs. commodity snacks). Papers in healthcare and humanitarian

logistics stress that criticality must be assessed by impact on health, safety, or core operations rather than simple revenue metrics (Khan, Alroomi & Nikolopoulos, 2022; Fiksel, Polyviou, Croxton & Petit, 2015).

Supply-chain vulnerability captures structural exposure: supplier concentration, single-sourcing, geographic risk (natural disasters, geopolitical hotspots), and long lead times. Studies show that vulnerability is often a function of supplier network topology and external threat exposure, not just vendor count (Hobbs, 2020; Garnett, Doherty & Heron, 2020).

Most frameworks recommend a priority matrix (or risk–importance matrix) where products fall into four quadrants: High criticality / High vulnerability (top priority for resilience), High criticality / Low vulnerability (monitor), Low criticality / High vulnerability (consider cost-effective hedges), and Low/Low (minimal intervention) (Fiksel, Polyviou, Croxton & Petit, 2015; Garnett, Doherty & Heron, 2020).

Operational research work shows how this product-level prioritization can be turned into actionable decisions (how much safety stock, whether to dual-source, whether to onshore parts of production) by coupling criticality weights with vulnerability scores and cost constraints (Nikolopoulos, Punia, Schäfers, Tsiniopoulos & Vasilakis, 2021). The consensus is clear: not all products merit the same resilience treatment, and misallocating resilience resources (e.g., stockpiling low-criticality, low-vulnerability items) wastes scarce capacity and drives unnecessary cost (Fiksel, Polyviou, Croxton & Petit, 2015; Nikolopoulos, Punia, Schäfers, Tsiniopoulos & Vasilakis, 2021).

Saline solution (healthcare) cited by Dr. Ergun and analysed in related literature shows that saline is highly critical for hospitals and was produced in a geographically concentrated way (Puerto Rico factories), making it highly vulnerable; the resulting outages caused severe downstream effects (surgery cancellations), illustrating a High-Criticality / High-Vulnerability case that justifies maximal resilience measures (redundant capacity, prioritized fuel allocation, contingency logistics).

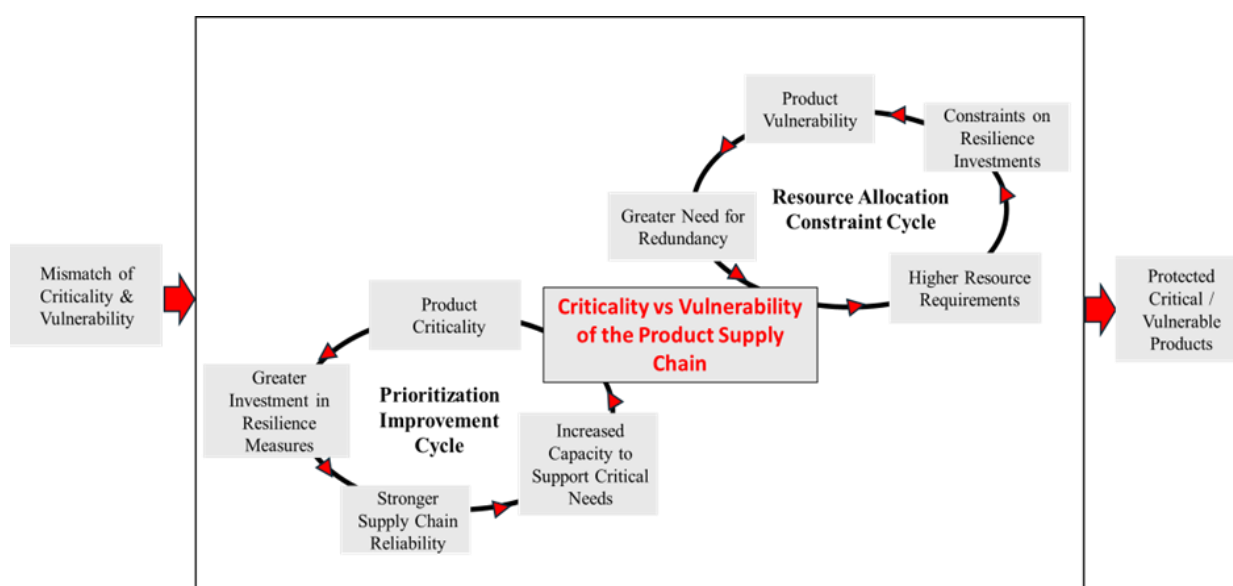
The saline case is a classic example used to argue for product-level prioritization rather than blanket policies. (See webinar transcript; related thematic discussion in (Khan, Alroomi & Nikolopoulos, 2022; Hobbs, 2020). Supermarket SKUs during COVID-19 empirical work on groceries shows that items like long-life staples (pasta, rice) became functionally critical during panic periods even if their normal criticality is low; supply vulnerabilities (import dependence, driver shortages) changed rapidly through policy (lockdowns, Brexit) and thus required dynamic reprioritization of resilience actions (Khan, Alroomi & Nikolopoulos, 2022; Garnett, Doherty & Heron, 2020).

3.2.1 Summary

The literature converges on two practical implications:

- (a) Firms should score products on criticality and vulnerability and use that matrix to allocate resilience investments.
- (b) These scores should be periodically refreshed because vulnerability (e.g., supplier risk, trade policies) and criticality (e.g., shifting clinical guidelines, consumer habits) can change over time.

3.2.2 Causal summary



3.3 Onshoring vs Globalization

The COVID-19 pandemic, geopolitical tensions, and climate-related disruptions have renewed debate on whether firms should onshore (bring production and sourcing closer to home) or remain globalized (spread sourcing and production internationally).

Globalization advantages include cost savings from labour arbitrage, access to specialized capabilities, and diversified sourcing across geographies, which can buffer local shocks (Gereffi, 2020; Simchi-Levi & Simchi-Levi, 2020). However, long global supply lines increase exposure to transport delays, trade policy changes, and multi-jurisdictional risk (Shih, 2020; Barbieri, Boffelli, Elia, Fratocchi, Kalchschmidt & Samson, 2020).

For example, the heavy reliance on East Asian semiconductor foundries left automakers vulnerable during COVID-19 and shipping delays; some manufacturers responded by onshoring or near-shoring certain packaging operations but still relied on global foundries for advanced nodes (Simchi-Levi & Simchi-Levi, 2020; Barbieri, Boffelli, Elia, Fratocchi, Kalchschmidt & Samson, 2020).

Onshoring advantages focus on reduced lead times, closer supplier–customer collaboration, and better control over quality and IP. Literature also notes improved resilience to global disruptions (pandemics, port closures) but warns of higher unit costs and limited domestic supplier capacity (Shih, 2020; Ellram & Tate, 2016). The early-pandemic shortages of PPE led several countries to onshore mask production. While this improved local availability during crises, many production lines became idle once global supply normalized and demand fell, illustrating the cost risks of permanent onshoring (Gereffi, 2020; Shih, 2020).

Several studies advocate regionalization as a hybrid approach — e.g., “China + 1” strategies where global networks are kept for cost and capacity, but critical or high-risk components are localized to mitigate extreme events (Barbieri, Boffelli, Elia, Fratocchi, Kalchschmidt & Samson, 2020; Strange & Zucchella, 2017). Modelling work shows that optimal sourcing

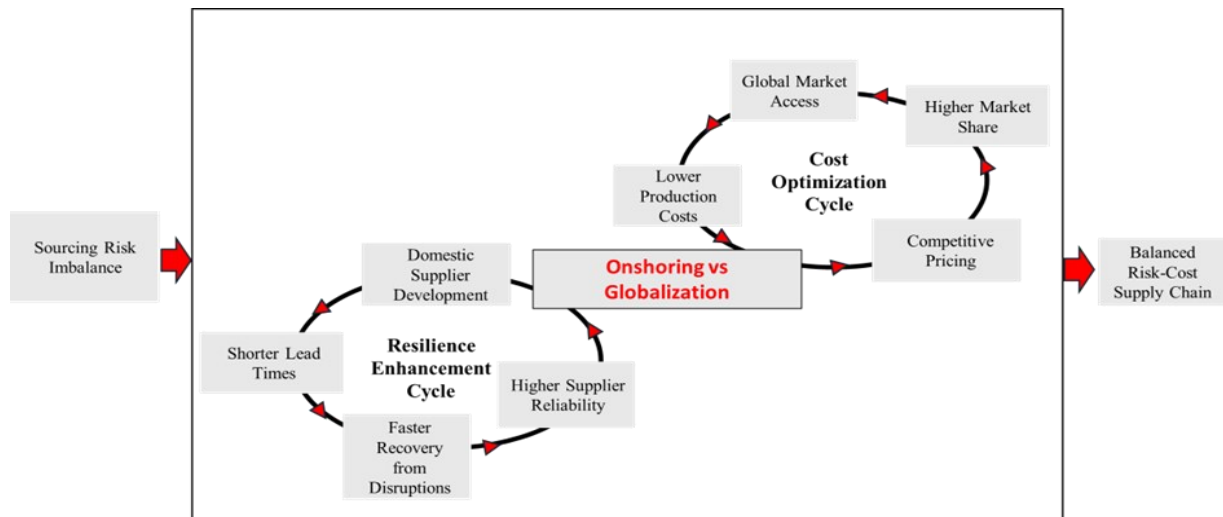
strategies depend on the probability and severity of disruption, cost differentials between domestic and offshore supply, and the time sensitivity of demand (Simchi-Levi & Simchi-Levi, 2020; Ellram & Tate, 2016). There is strong consensus that no one-size-fits-all strategy works; the best choice varies by product criticality, vulnerability, and market conditions (Barbieri, Boffelli, Elia, Fratocchi, Kalchschmidt & Samson, 2020; Strange & Zucchella, 2017).

3.3.1 Summary

The literature supports a contingent strategy:

- Onshore or regionalize critical, vulnerable, and time-sensitive items.
- Maintain global sourcing where cost advantages, specialization, or capacity needs outweigh the risks.
- Reassess regularly as risk profiles, political conditions, and technology change.

3.3.2 Causal Summary



3.4 Just-In-Time (JIT) vs Stockpiling

The literature treats JIT and stockpiling as two ends of a trade-off between efficiency and buffered resilience. Lean/JIT approaches minimize inventory and cost, improving short-term efficiency and cash flow, but they reduce the system's ability to absorb shocks; conversely, stockpiling (safety stocks, strategic reserves) increases robustness at the expense of carrying costs and potential waste for perishable goods (Carvalho, Duarte & Machado, 2011; Zarei, Fakhrazad & Jamali Paghaleh, 2011; Hobbs, 2020). Several studies show this is not a binary choice but a portfolio problem: firms should combine lean practices with targeted buffers where the product's risk profile or downstream criticality requires it (Carvalho, Duarte & Machado, 2011; Shekarian, Nooraie & Parast, 2020).

Operational research and empirical work underline two practical points. First, the effectiveness of JIT depends on stability of lead times and supplier reliability; when these are stable, JIT delivers large cost savings, but when disruptions are frequent or severe, JIT amplifies shortage effects (the bullwhip effect) (Lee, Padmanabhan & Whang, 1997; Hobbs, 2020). Second, stockpiling is most justified for items that are critical, non-substitutable, or have long replenishment lead times (e.g., certain medical supplies), while for fast-moving, noncritical

SKUs it is often inefficient (Syntetos, Babai, Boylan, Kolassa & Nikolopoulos, 2016; Fiksel, Polyviou, Croxton & Petit, 2015).

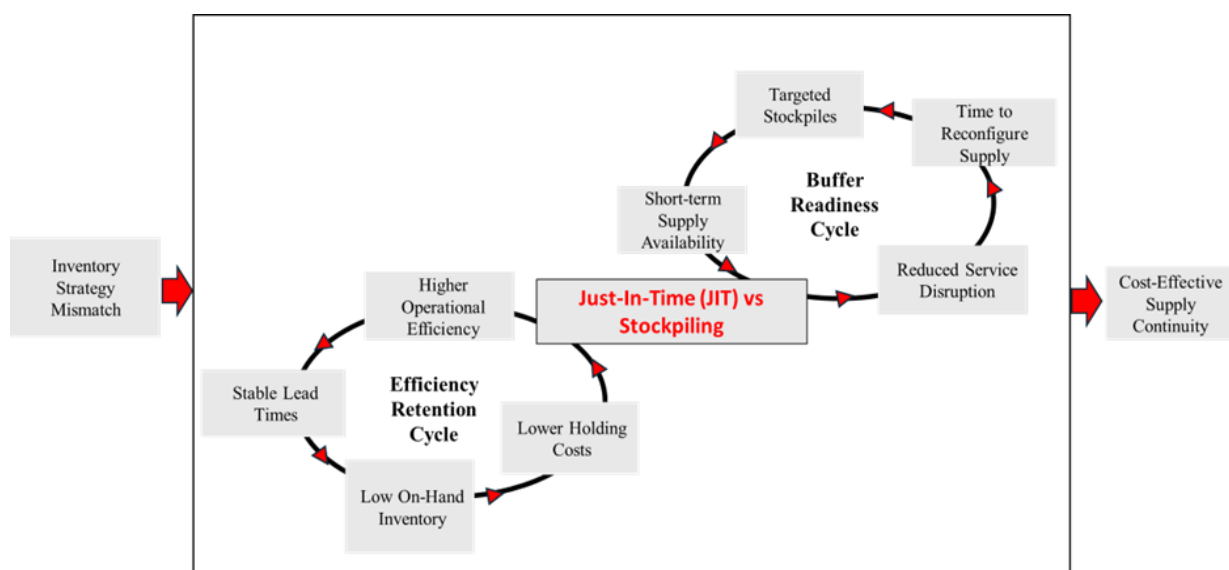
Embedded examples illustrate the trade-offs. Food retail during COVID-19 showed how JIT and lean assortments struggled when panic buying and transport delays occurred; supermarkets that relied strictly on low on-hand inventory faced empty shelves, whereas those that retained higher safety stocks for key staples could maintain service (Hobbs, 2020; Syntetos, Babai, Boylan, Kolassa & Nikolopoulos, 2016). In manufacturing, airports and airlines running near-100% utilization (effectively JIT capacity) experienced massive cancellations when disruptions hit, revealing that capacity buffers like spare aircraft or standby crews are resilience enablers but expensive to maintain (Shekarian, Nooraie & Parast, 2020).

Recent papers emphasize hybrid strategies: dynamic, risk-based buffers (hold inventory for high-risk/high-criticality items), flexible contracts (volume options), and capacity-sharing agreements so that the system maintains efficiency most of the time but can scale during crises (Carvalho, Duarte & Machado, 2011; Shekarian, Nooraie & Parast, 2020; Nikolopoulos, Punia, Schäfers, Tsinopoulos & Vasilakis, 2021). Forecasting and information sharing reduce the need for very large physical buffers by improving anticipation, though forecasts themselves are imperfect during novel shocks (Syntetos, Babai, Boylan, Kolassa & Nikolopoulos, 2016; Nikolopoulos, Punia, Schäfers, Tsinopoulos & Vasilakis, 2021).

3.4.1 Summary

JIT delivers efficiency under normal conditions, stockpiling buys time under disruption. Best practice is a selective, data-driven mix: keep lean flows where risk is low and maintain targeted buffers (or other hedges) where vulnerability and criticality demand it, supported by improved visibility and contingency contracts.

3.4.2 Causal Summary



3.5 Supplier Diversification vs Consolidation

Supplier diversification refers to spreading procurement across multiple suppliers and/or regions to reduce vulnerability to single points of failure. The concept has gained prominence during COVID-19 and other recent disruptions, where concentrated supply chains created bottlenecks in critical sectors such as medical equipment and food. The literature suggests that diversification, when designed appropriately, can enhance resilience without completely sacrificing efficiency (Pettit, Croxton & Fiksel, 2013; Ivanov & Dolgui, 2020; Gereffi, 2020).

Studies show that supplier diversification mitigates the impact of localized disruptions by creating redundancy and enabling faster recovery. Gereffi highlights the risks of global value chains overly concentrated in specific regions, especially for medical supplies, and argues for regional balancing. Khan et al. provide practical examples from UK supermarkets, such as switching to alternative honey suppliers and shifting transport modes to maintain product freshness. Garnett et al. identify structural vulnerabilities in UK food supply chains, reinforcing the need for a broader supplier base.

Barbieri et al. and Ellram & Tate explore reshoring and nearshoring as diversification tactics, noting that they can shorten lead times and reduce geopolitical risk, but are not universally cost-effective. Shih warns against “false diversification,” where multiple suppliers are located in the same vulnerable region.

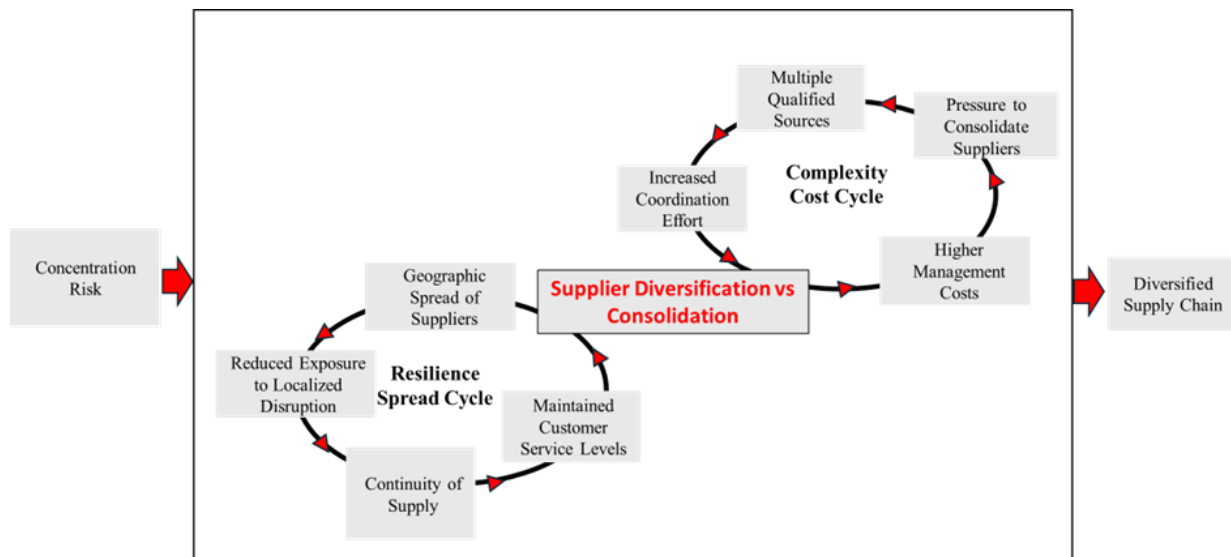
Other works (Tukamuhabwa, Stevenson, Busby & Zorzini, 2015; Pettit, Croxton & Fiksel, 2013). recommend tailoring diversification based on a product’s importance to the end user and the susceptibility of its supply chain, stressing that no single strategy fits all contexts.

However, diversification comes with trade-offs. Carvalho et al. and Zarei et al. note that more suppliers can increase procurement costs and coordination complexity, while Golan et al. and Lee et al. stress the need for strong visibility and forecasting systems to manage the added complexity effectively.

3.5.1 Summary

The literature broadly agrees that supplier diversification can strengthen resilience by reducing geographic and supplier concentration risks, but this benefit comes with cost and complexity trade-offs. Effective diversification must be tailored to the criticality and vulnerability of each product’s supply chain, avoiding “false diversification” and supported by strong coordination and visibility systems.

3.5.2 Causal Summary



3.6 Information Sharing vs Gate Keeping

Effective information sharing is a cornerstone of resilient supply chains, enabling timely decision-making, improving visibility, and reducing uncertainty across the network. Literature consistently highlights its role in mitigating disruptions by aligning demand and supply signals, enhancing coordination, and reducing the bullwhip effect (Lee, Padmanabhan & Whang, 1997). The exchange of accurate, timely, and relevant data among suppliers, manufacturers, and customers improves forecast accuracy, facilitates collaborative planning, and supports contingency management (Hohenstein, Feisel, Hartmann & Giunipero, 2015; Pettit, Croxton & Fiksel, 2013; Fiksel, Polyviou, Croxton & Petit, 2015).

Empirical studies show that transparent demand sharing allows upstream suppliers to adjust production schedules more effectively, while visibility into supplier inventory and capacity helps downstream actors anticipate shortages (Pettit, Croxton & Fiksel, 2013; Fiksel, Polyviou, Croxton & Petit, 2015).

During the COVID-19 pandemic, companies with established data-sharing protocols whether through electronic data interchange (EDI), shared dashboards, or integrated ERP systems were able to reallocate resources faster and coordinate responses more effectively (Queiroz, Ivanov, Dolgui & Fosso Wamba, 2020; Ivanov, 2021; Golan, Jernegan & Linkov, 2020).

However, the literature also warns that information sharing is not without challenges. Mistrust between partners, data quality issues, incompatible IT systems, and fears of opportunistic behaviour can limit the depth and frequency of data exchange (Hohenstein, Feisel, Hartmann & Giunipero, 2015; Pettit, Croxton & Fiksel, 2013). In addition, sharing sensitive operational or demand information can raise competitive and privacy concerns, particularly when dealing with multi-tier networks or coopetition arrangements (Gereffi, 2020).

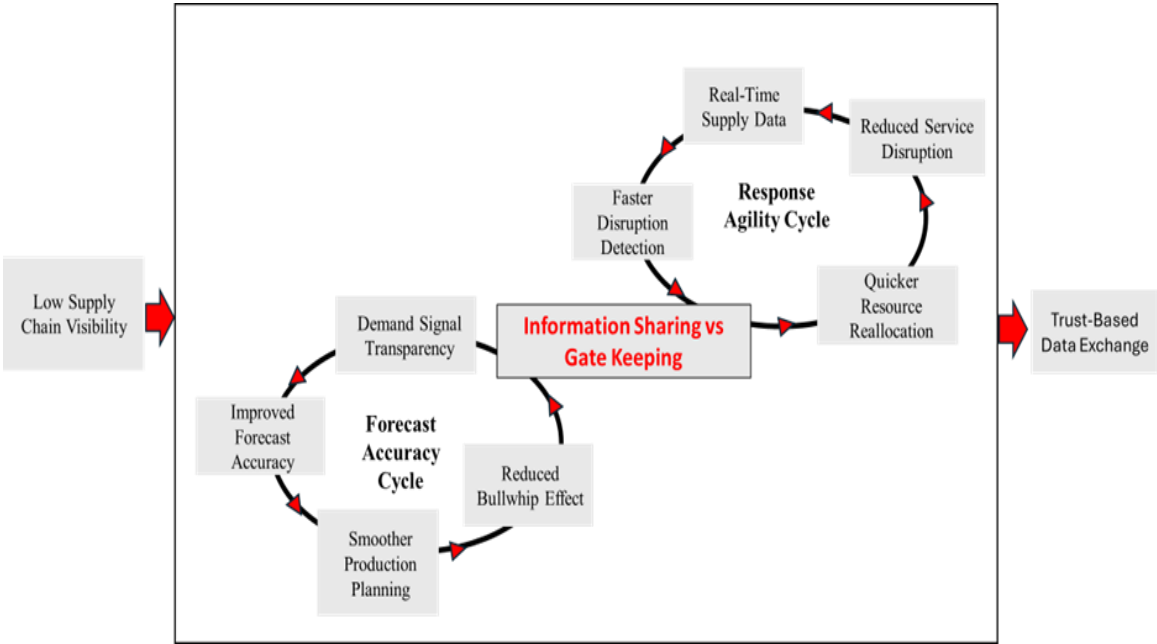
Several authors advocate a selective, trust-based approach: focusing deep information sharing on critical, high-vulnerability supply lines while maintaining broader but less detailed sharing elsewhere (Kamalahmadi & Parast, 2016; Pettit, Croxton & Fiksel, 2013; Fiksel, Polyviou, Croxton & Petit, 2015).

Best practices include establishing clear governance for data use, investing in interoperable digital platforms, and embedding information-sharing clauses into contracts (Pettit, Croxton & Fiksel, 2013; Ivanov, 2021; Fiksel, Polyviou, Croxton & Petit, 2015).

3.6.1 Summary

The literature establishes information sharing as a key resilience enabler that improves forecast accuracy, reduces the bullwhip effect, and accelerates disruption response. Its effectiveness depends on trust, data quality, technical integration, and targeted application to critical supply lines.

3.6.2 Causal Summary



3.7 Public Messaging vs Targeted Communication

Communication during supply chain disruptions can shape how quickly markets stabilize and how customers respond. Literature highlights two distinct approaches: broad, public messaging directed at consumers and stakeholders, and targeted communication aimed at supply chain partners and critical customers. Both are important, but they play different roles and come with trade-offs.

Public messaging such as official press releases, retailer statements, or media announcements helps to reassure consumers, maintain trust, and prevent panic buying.

For example, Hobbs notes that transparent communication during COVID-19 in the Canadian food supply chain reduced consumer uncertainty and limited irrational stockpiling. Similarly, studies of UK supermarkets found that early reassurance campaigns and clear signage moderated consumer fears despite temporary shortages (Khan, Alroomi & Nikolopoulos, 2022; Garnett, Doherty & Heron, 2020).

In contrast, targeted communication is about precision and coordination with key suppliers, distributors, and institutional buyers. Such tailored messaging includes priority allocations, shared disruption alerts, and scenario-specific instructions (Queiroz, Ivanov, Dolgui & Fosso Wamba, 2020; Ivanov, 2021). Evidence shows that targeted communication enables better alignment of scarce capacity, improves coordination on product prioritization, and supports faster recovery (Pettit, Croxton & Fiksel, 2013; Fiksel, Polyviou, Croxton & Petit, 2015).

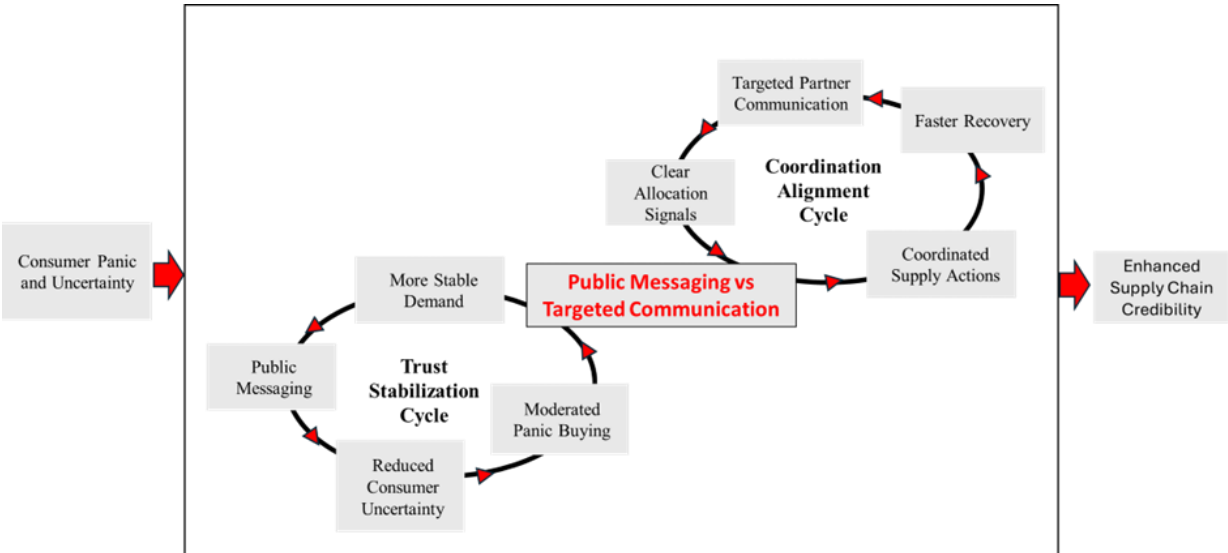
However, both approaches have weaknesses. Overly broad public messaging without matching action can erode credibility if consumers still face empty shelves (Garnett, Doherty & Heron, 2020). Meanwhile, limited or inconsistent targeted communication across partners may result in misaligned responses, duplicated efforts, or perceived unfairness in allocation (Hohenstein, Feisel, Hartmann & Giunipero, 2015).

The literature suggests that resilient firms employ a dual strategy: using public messaging to maintain consumer trust and protect brand reputation, while simultaneously deploying targeted, structured communication with supply chain partners to ensure operational coherence (Hobbs, 2020; Fiksel, Polyviou, Croxton & Petit, 2015; Garnett, Doherty & Heron, 2020; Simchi-Levi & Simchi-Levi, 2020).

3.7.1 Summary

Resilient communication combines broad, public messaging to maintain consumer trust with targeted, partner-specific communication to coordinate supply responses. The balance between reassurance and precision is critical for avoiding consumer panic while ensuring operational effectiveness.

3.7.2 Causal Summary



4. Conclusion

4.1 Convergence of Practice and Research

Both the webinar and the academic literature converge on a central message: resilience requires balancing efficiency with adaptability, rejecting universal prescriptions, and tailoring strategies to product criticality and vulnerability. Flexibility, selective buffering, supplier diversification, and communication emerge consistently as essential levers.

Added Value of Research

Where the literature extends beyond the webinar is in analytical rigor. Academic work formalizes trade-offs, quantifies resilience investments, and tests solutions through empirical evidence. For example, diversification is problematized in the literature by highlighting “false diversification” when sources remain geographically clustered. Similarly, information-sharing is supported by models showing its role in mitigating the bullwhip effect and enhancing agility—while also underscoring the necessity of governance and trust, which the webinar only alluded to.

Implications for Decision-Makers

The comparison demonstrates that the webinar offers actionable heuristics, while the literature provides the depth and validation needed for structured decision-making. Taken together, they suggest that resilience strategies must be simultaneously **pragmatic and evidence-informed**: grounded in context-specific practice, yet tested against analytical frameworks to avoid blind spots and false confidence.

4.2 Additional Learnings from Literature

While the webinar outlined practical heuristics such as diversifying suppliers, balancing JIT with stockpiling, and aligning communication, the literature adds greater depth and analytical rigor. It introduces concepts like “false diversification,” where multiple suppliers are still regionally concentrated, undermining resilience. It also formalizes prioritization of supply chains by linking resilience investments explicitly to product criticality and vulnerability and models how hybrid sourcing strategies (global plus local) can be optimized using Industry 4.0 technologies.

The literature also contributes quantified evidence and governance insights absent in the webinar. For example, it demonstrates how real-time demand data sharing reduces the bullwhip effect and stresses the role of trust and contractual mechanisms in making information sharing effective. Likewise, it documents how poorly aligned public, and targeted communication can damage credibility, extending the webinar’s emphasis on messaging. In short, while the webinar offered strategic intuition, the literature adds tools, models, and empirical cases that make those strategies actionable and measurable.

4.3 Final thoughts on building resilient supply chains

The findings from both the webinar and the reviewed literature converge on a simple but powerful idea: resilience in supply chains is not a single strategy but a portfolio of tailored responses. Firms must recognize that each product and supply chain carry its own profile of criticality, vulnerability, and risk exposure. Strategies like diversification, selective stockpiling, or local sourcing are most effective when applied with this product- and context-specific logic rather than through one-size-fits-all prescriptions.

The literature strengthens the practitioner insights from the webinar by providing structured models and empirical evidence. It highlights pitfalls such as false diversification, quantifies benefits of information sharing, and shows how digital technologies can enable more adaptive sourcing and inventory strategies. At the same time, it stresses the importance of governance, trust, and credible communication as social and organizational enablers of technical solutions.

Ultimately, resilience is best understood not as the opposite of efficiency but as its long-term complement. Efficient supply chains without resilience are brittle, while resilient supply chains without efficiency are unsustainable.

Building resilient supply chains therefore requires balancing these forces through deliberate design, continuous monitoring, and the willingness to adapt as risks evolve. Organizations that embrace this dual mindset will be better positioned not only to survive future disruptions but also to sustain competitiveness in an uncertain global landscape.

4.4 Limitations of this study

Although both the webinar discussion and the academic literature provide valuable insights into building resilient supply chains, there are notable gaps and limitations in the current body of knowledge. Much of the literature focuses on conceptual models and frameworks, but there is limited empirical evidence that validates these strategies across different industries, geographies, and scales of operation. For instance, while diversification, onshoring, or stockpiling are widely proposed, fewer studies examine the actual performance trade-offs or unintended consequences of these approaches in practice.

Another limitation lies in the narrow treatment of enablers such as governance, trust, and social dynamics. While information sharing and communication are consistently identified as resilience levers, the literature provides fewer insights on how to operationalize these practices across competitive, global supply networks where incentives are misaligned. Similarly, both the literature and the webinar emphasize technology and visibility, but their discussions remain high-level, with insufficient clarity on how digital tools, data standards, and interoperability challenges can be overcome in real-world contexts.

Finally, the existing research and practitioner discourse remain reactive rather than anticipatory. Much of the emphasis is on recovery and adaptation after disruptions, while fewer contributions explore proactive design for resilience or long-term sustainability trade-offs. This creates a gap in understanding how resilience strategies can be embedded into strategic planning rather than bolted-on in response to crises.

4.5 Scope of Future Work

Future research on supply chain resilience should move beyond conceptual frameworks and deepen empirical validation across diverse industries and geographies. Comparative case studies, large-scale surveys, and longitudinal data can help identify which resilience strategies deliver measurable improvements in performance, cost, and recovery speed under different conditions. Such evidence would strengthen the practical relevance of the models currently available in the literature.

Another promising area is the operationalization of enablers such as trust, governance, and collaboration. More work is needed to understand how firms can design contracts, incentives, and digital platforms that promote genuine information sharing without compromising com-

petitive advantage. Research can also explore how cultural and institutional differences influence the adoption of these practices in global supply networks.

Finally, resilience research should increasingly take a proactive and integrative perspective. This includes investigating how resilience can be embedded into long-term strategic planning, sustainability goals, and Industry 4.0 transformations, rather than being treated only as a reactive measure during crises. Simulation-based modelling, system dynamics, and AI-driven scenario analysis offer powerful tools for anticipating vulnerabilities and designing context-specific strategies. By addressing these areas, future work can bridge the gap between high-level prescriptions and actionable, evidence-based roadmaps for building resilient supply chains.

Bibliography

- Barbieri, P., Boffelli, A., Elia, S., Fratocchi, L., Kalchschmidt, M., & Samson, D. (2020). What can we learn about reshoring after COVID-19? *Operations Management Research*.
- Carvalho, H., Duarte, S., & Machado, V. C. (2011). Lean, agile, resilient and green: Divergencies and synergies. *International Journal of Lean Six Sigma*, 2(2), 151–179.
- Ellram, L. M., & Tate, W. L. (2016). Redefining supply management's contribution in reshoring. *Journal of Supply Chain Management*.
- Fiksel, J., Polyviou, M., Croxton, K. L., & Petit, T. J. (2015). From risk to resilience: learning to deal with disruption. *MIT Sloan Management Review*.
- Garnett, P., Doherty, B., & Heron, T. (2020). Vulnerability of the United Kingdom's food supply chains exposed by COVID-19. *Nature Food*.
- Gereffi, G. (2020). What does the COVID-19 pandemic teach us about global value chains? The case of medical supplies. *Journal of International Business Policy*.
- Golan, M. S., Jernegan, L. H., & Linkov, I. (2020). Trends and applications of resilience analytics in supply chain modeling: Systematic literature review in the context of the COVID-19 pandemic. *Environment Systems and Decisions*, 40(2), 222–243.
- Govindan, K., Mina, H., & Alavi, B. (2020). A decision support system for demand management in healthcare supply chains considering the epidemic outbreaks: A case study of coronavirus disease 2019 (COVID-19). *Transportation Research Part E: Logistics and Transportation Review*, 138, 101967.
- Hobbs, J. (2020). Food supply chains during the COVID-19 pandemic. *Canadian Journal of Agricultural Economics*.
- Hohenstein, N. O., Feisel, E., Hartmann, E., & Giunipero, L. (2015). Research on the phenomenon of supply chain resilience: A systematic review and paths for further investigation. *International Journal of Physical Distribution & Logistics Management*.
- H. L. Lee, V. Padmanabhan, S. Whang. (1997). The bullwhip effect in supply chains. *Sloan Management Review*, 38(3), 93–102.
- Ivanov, D. (2021). Supply chain viability and the COVID-19 pandemic: A conceptual and formal generalisation of four major adaptation strategies. *International Journal of Production Research*, 59(12), 3535–3552.
- Ivanov, D., & Dolgui, A. (2020). Viability of intertwined supply networks: Extending the supply chain resilience angles towards survivability. *International Journal of Production Research*, 58(10), 2904–2915.
- Kamalahmadi, M., & Parast, M. M. (2016). A review of the literature on the principles of enterprise and supply chain resilience: Major findings and directions for future research. *International Journal of Production Economics*, 171, 116–133.
- Khan, M., Alroomi, A., & Nikolopoulos, K. (2022). Supply Chain Disruptions and Consumer Behavior Change from COVID-19: Empirical Evidence and Long-Term Implications for Supermarkets in the UK. *Journal of Humanities, Arts and Social Science*.
- Nikolopoulos, K., Punia, S., Schäfers, A., Tsinopoulos, C., & Vasilakis, C. (2021). Forecasting and planning during a pandemic: COVID-19 growth rates, supply chain disruptions, and governmental decisions. *European Journal of Operational Research*.

- Pettit, T. J., Croxton, K. L., & Fiksel, J. (2013). Ensuring supply chain resilience: Development of a conceptual framework. *Journal of Business Logistics*, 34(1), 46–76.
- Queiroz, M. M., Ivanov, D., Dolgui, A., & Fosso Wamba, S. (2020). Impacts of epidemic outbreaks on supply chains: Mapping a research agenda amid the COVID-19 pandemic through a structured literature review. *Annals of Operations Research*.
- Shekarian, M., Nooraie, S. V., & Parast, M. M. (2020). An examination of the impact of flexibility and agility on mitigating supply chain disruptions. *International Journal of Production Economics*, 220, 107438.
- Shih, W. C. (2020). Global supply chains in a post-pandemic world. *Harvard Business Review*.
- Simchi-Levi, D., & Simchi-Levi, E. (2020). Designing resilient supply chains for the future. *MIT Sloan Management Review*.
- Strange, R., & Zucchella, A. (2017). Industry 4.0, global value chains and international business. *Multinational Business Review*.
- Syntetos, A., Babai, Z., Boylan, J., Kolassa, S., & Nikolopoulos, K. (2016). Supply chain forecasting: Theory, practice, their gap and the future. *European Journal of Operational Research*.
- Zarei, M., Fakhrzad, M. B., & Jamali Paghaleh, M. (2011). Food supply chain leanness using a developed QFD model. *Journal of Food Engineering*, 102(1), 25–33.

Japan's Corporate Resurgence: Substance or Spectacle?

Abstract:

This paper critically analyzes whether Japan's recent stock market rally and improved corporate performance represent a real economic revival or are primarily the result of financial engineering and governance reforms—changes that have not yet addressed deeper structural weaknesses in the economy. The study distinguishes between corporate resurgence, marked by better ROE, dividends, and transparency, and industrial resurgence, which involves genuine gains in productivity, innovation, and global competitiveness.

The paper argues that while governance reforms have delivered short-term financial gains, they have not sparked the productivity breakthroughs and widespread industrial renewal necessary for sustainable growth. For Japan's economic revival to endure, bridging the gap between financial performance and genuine industrial transformation will be essential.



EMMANUEL SELVA

Research Associate,
Mizuho India Japan Study Centre
Indian Institute of Management
Bangalore

Index of Content

1. Introduction
2. Defining Resurgence
3. Key Drivers of Resurgence
 - 3.1. Governance and Capital Market Discipline
 - 3.2. Strategic Restructuring and Profitability
 - 3.3. Global Positioning and Industrial Champions
 - 3.4. Policy Support and Innovation Push
4. The Digital and AI Dilemma
 - 4.1. Digital Transformation (DX)
 - 4.2. Artificial Intelligence (AI)
5. Indicators of Success: Beyond the Stock Market
 - 5.1. Financial Metrics
 - 5.2. Industrial Competitiveness
 - 5.3. Distributional Reality
6. Analysis
7. Conclusion

1. Introduction

Japan's economy has struggled since the early 1990s. The collapse of the late-1980s asset price bubble ushered in decades of stagnation and deflation, often dubbed the "Lost Decades." By some measures, Japan's real GDP grew only ~0.8% per year between 1990 and 2022: the second-lowest rate of the G7 (OECD, 2025). Likewise, since 1970 Japan has fallen from leading the G7 in productivity to the bottom (about 58% of U.S. productivity today) (Kumakura, 2022). Against this backdrop of prolonged malaise, recent years have seen an extraordinary rally in Japanese stocks. The Nikkei 225 index reached all-time highs (above 40,000 points) by early 2024 and gained over 28% in 2023 alone (Lardieri & Cloutes, 2024). Foreign investors, drawn by a cheap yen and promised reforms, flocked to Japanese equities (Lardieri & Cloutes, 2024). This dramatic financial upswing has prompted talk of a corporate "resurgence."

But is this *real* revival or mere surface-level enthusiasm? The provocative question we explore is whether Japan's corporate turnaround reflects a **structural** transformation of its industries (rooted in innovation, productivity, and competitiveness), or whether it is largely a **financial** phenomenon driven by governance optics and market exuberance. Put differently, are Japanese firms becoming truly world-class through deep reforms, or are they simply boosting profitability and share prices on the backs of capital reallocation while leaving underlying weaknesses intact?

The objective of this study is to critically evaluate Japan's purported corporate comeback by examining its drivers, vulnerabilities, and sustainability. We contrast "corporate resurgence" improvements in governance, returns and shareholder discipline with broader "industrial resurgence" gains in competitiveness, innovation and productivity. We employ an analytical lens that distinguishes between shareholder-value creation and real industrial renewal. Our working hypothesis is that Japan's recent success has been **selective and uneven**: a handful of global champions (in auto, electronics, robotics, etc.) have pivoted into growth niches, but the wider economy of small firms and service industries remains largely unchanged.

2. Defining Resurgence

Our analytical framework centers on distinguishing two dimensions of economic revival that are often conflated in popular discourse. **Corporate resurgence** encompasses improvements in financial metrics, governance structures, and capital market performance. This includes enhanced return on equity (ROE), increased dividend payments and share buybacks, greater board independence, improved transparency, and rising stock valuations. These changes reflect management's responsiveness to shareholder demands and adoption of global best practices in corporate governance.

Industrial resurgence, by contrast, involves fundamental improvements in productive capacity, competitive positioning, and innovation capabilities. This encompasses rising productivity growth rates, expanding market share in key sectors, breakthrough innovations and technological leadership, successful entry into high-growth markets, and development of new industries or business models. Industrial resurgence reflects an economy's ability to create sustainable value through superior products, processes, and services.

While these dimensions can be complementary, good governance may facilitate productive investment, and industrial success typically improves financial performance, they can also diverge significantly. Companies may improve shareholder returns through financial engineering (asset sales, cost cutting, share repurchases) without enhancing underlying competitiveness. Conversely, firms making substantial investments in innovation or market development may depress short-term financial metrics while building long-term competitive advantages.

3. Key Drivers of Resurgence

3.1. Governance and Capital Market Discipline

A major element of Japan's corporate reforms has been strengthening governance and investor engagement. In the last decade, the government and regulators introduced the *Corporate Governance Code* (first issued 2015) and the *Stewardship Code* (2014) to pressure firms and investors toward more accountable practices. Nearly all listed firms now comply with basic Code provisions -- for example, by 2025 about 87% of prime-listed companies had boards with at least one-third independent directors (ISS Governance, 2025). Similarly, institutional investors have increasingly signed on to stewardship principles (324 investors by April 2023) (Financial Services Agency, 2023), pledging to engage with companies on performance. These formal reforms reflect the recognition that Japanese firms have long underperformed: roughly 40-50% of Topix-500 companies still trade below book value ($PBR < 1$) and 40% report ROE (Return on Equity) under 8% (Financial Services Agency, 2023). These figures starkly contrast with global peers: only ~5% of U.S. firms have PBR (Price-to-Book Ratio) < 1 , and most major U.S./European firms deliver double-digit ROE (Financial Services Agency, 2023). In short, Japan's corporates historically generated poor returns on equity and were undervalued, motivating the drive for governance reform.

To illustrate the sequence of reforms, the timeline below summarizes major policy initiatives in corporate governance:

Year	Key Governance Reform
2014	<i>Stewardship Code</i> introduced (Feb)
2015	<i>Corporate Governance Code</i> introduced (June)
2018	CG Code revised: added emphasis on mid-term plans, shareholder proposals, ESG disclosures.
2021	CG Code revised: encouraged corporate splits/spinoffs; TSE "Prime" tier requires English disclosure (from 2025)
2023	TSE issues "Action Plan" (Mar): companies urged to improve capital efficiency (focus on ROE, PBR, WACC)
2025	New CG Code expectations: top-tier firms must publish key materials in English (Mar)

Table.1 Timeline of Corporate Governance Reforms. Source: *Table compiled by author from various sources*

These reforms reflect a shift toward **shareholder-centric governance**. They aim to reduce excessive cross-shareholding, enforce board independence, and compel underperforming firms to streamline operations or undertake shareholder-friendly actions (stock buybacks, dividends, business divestitures) (Newton Investment Management, 2023; J.P. Morgan Asset Management, 2025). Investors now expect Japanese companies to justify their valuations with metrics like return on equity and invested capital, a major change from past practice.

Activist investing has played a catalytic role. What was once taboo in Japan, hedge fund agitation, is now tolerated if not encouraged. High-profile scandals (like the Olympus accounting fraud) exposed entrenched governance failings. In the wake of the Olympus scandal, the U.S. activist fund ValueAct Partners took a stake and even won a board seat in 2019, a landmark for Japan (Reuters, 2019a, 2019b). Southeast Asset Management and others had earlier in 2012 openly denounced Olympus's "shoddy corporate governance" and discredited board (Reuters, 2012). These events signaled a shift: Japanese companies can no longer ignore shareholder demands.

Empirical data show rising shareholder assertiveness. In 2023 shareholders proposed record numbers of agendas at top firms (81 proposals versus 63 in 2022) (Reuters, 2023a). Though none passed outright, many won significant minority support. Investor backing for proposals (e.g., requiring climate plans at Kansai Electric, nominating ValueAct directors) climbed as regulators and institutional players aligned with activists (Reuters, 2023a, 2023b). Even companies not directly targeted have begun preparing "cost of capital" disclosures, spurred by the TSE's 2023 exhortation for firms to raise shareholder value. The Tokyo Stock Exchange (TSE) explicitly asked listed companies to report plans for capital efficiency and higher ROE, and published lists of "good" and "bad" disclosures (J.P. Morgan Asset Management, 2025; Newton Investment Management, 2023). The result has been a jump in share buybacks and dividends: preliminary 2024 data show repurchase announcements far above prior years.

However, a key question remains: are these changes *internalized*, or merely the result of external pressure? Many critics note that compliance with codes can be superficial, and the deeply ingrained stakeholder-oriented mindset (favoring consensus and traditional networks) is slow to yield real change (Asanuma, 2023). For example, while 87% of companies now have independent directors (ISS Governance, 2025), board diversity and actual oversight vary widely; nearly 19% of Prime-market firms still have no female director at all (Hermes Investment, 2023). And while shareholder votes carry more weight (CEOs have been ousted at a few AGMs in 2025 for poor performance (Reuters, 2025)), activists note that outright battles remain rare and outcomes uncertain.

A telling case is **Olympus**. After the 2011 "tobashi" fraud, Olympus survived only by appointing Woodford as whistleblowing CEO, who was soon forced out by the entrenched old guard (Reuters, 2012). Years later, even that shaken institution resisted reform: in early 2012 foreign investors attempted to force change but met silent opposition from domestic shareholders (Reuters, 2012). Only under Abe-era pressure did Olympus later welcome ValueAct in 2019 (Reuters, 2019a). Olympus's saga illustrates Japan's governance dilemma: insider control and deference to group ties were so strong that even the worst scandal left the old board largely intact (Reuters, 2012). Only external outrage forced any turnaround.

Corporate governance reforms and market discipline are conspicuous factors in the recent corporate narrative. Codes, activists, and new listing rules have created a more hostile environment for underperformance. Yet the jury is still out on how deeply these reforms have penetrated management culture. Most evidence suggests that improvements (outside directors, buybacks) are happening under institutional prodding rather than organic innovation in corporate practice (Asanuma, 2023). We will see whether this yields sustained industrial gains or remains largely a financial stimulus.

3.2. Strategic Restructuring and Profitability

Another driver of Japan's resurgence is **corporate restructuring** -- i.e. companies slimming down, exiting uncompetitive sectors, and focusing on core businesses. This has unfolded partly in response to governance pressure, but also as a rational response to globalization and technological change.

The Tokyo Stock Exchange has itself catalyzed restructuring by tightening listing standards. Beginning in 2022, the TSE reorganized markets into Prime, Standard, and Growth sections, with stricter requirements (e.g. for equity, profitability, disclosure) for Prime listings (J.P. Morgan Asset Management, 2025; Newton Investment Management, 2023). About half of Prime-listed firms have already disclosed plans to improve capital efficiency or consider mergers (J.P. Morgan Asset Management, 2025). The TSE warns that many firms risk delisting if they do not raise ROE above 8-10% and trim excess cash.

These reforms have pushed managers to ask: if not us, who will enforce discipline?

Examples abound among Japan's multinationals. **Hitachi** is often cited. After posting an 800-billion-yen loss in 2008, Hitachi embarked on one of the most dramatic turnarounds. Over the past 15 years it sold off or spun out roughly 22 subsidiaries (in power, consumer appliances, etc.) to become a leaner "solution" company focused on energy systems and industrial infrastructure (J.P. Morgan Asset Management, 2025). This discipline paid off: Hitachi's shares outperformed peers, rising about 18.6% per year (EUR-denominated) over five years through 2024 (J.P. Morgan Asset Management, 2025). Another case is JSR, originally Japan Synthetic Rubber: it shed its old synthetic rubber business (sourced to cyclical demand) in 2021 and refocused on semiconductor materials. These divestments are often guided by private equity; for example, Blackstone-backed firesales of legacy units (like Hitachi's medical and finance arms) have pruned away low-margin operations.

Even in core electronics, firms are exiting unprofitable lines. Around 2011, Hitachi (and later Sony, Panasonic, Sharp) shuttered or outsourced their TV businesses, acknowledging "TVs are an unrewarding business" in the face of cheap Asian rivals (Reuters, 2011). These exits reflect a broader trend: Japan's electronics conglomerates are "playing to strengths" in components and automation, not fighting volume slumps in commoditized consumer goods (Reuters, 2011). For example, Toshiba sold its remaining PC and semiconductor fabs in recent years, and Panasonic spun off its home appliance units. Many auto parts makers and machinery firms have similarly refocused on high-end industrial clients rather than broad consumer markets.

The result of restructuring has been a **profitability surge** among the survivors, but not uniformly. Aggregate corporate profits hit record highs in recent years, partly buoyed by currency depreciation which inflated earnings in yen terms. Indeed, 2024 EPS across Japanese stocks jumped strongly (J.P. Morgan Asset Management, 2025). Yet return on equity has only modestly improved: JP Morgan reports that, despite robust EPS growth, Japan's aggregate ROE remains around 10%, because companies hoard cash and assets rather than redeploy for growth (J.P. Morgan Asset Management, 2025). This indicates that while profits are up, efficiency gains have been modest. In other words, many companies improved the *bottom line* by cost-cutting and financial maneuvers (share buybacks, cross-share unwinding) rather than by expanding revenue.

A key limitation is that these restructuring successes are concentrated in *large* firms. The leading industrial conglomerates and manufacturers (Hitachi, Toyota, Sony, etc.) have the scale and management to execute portfolio overhauls. By contrast, most Japanese SMEs remain over-diversified or complacent. Bank surveys and case studies repeatedly show that small companies are slower to cut unprofitable lines or innovate. In part this is cultural (loyalty to legacy businesses) and in part resource-driven (lack of talent or capital to restructure). Thus, the profitability gains so far appear "lumpy": few winners grab most of the upside, while the "long tail" of mid-sized firms stays flat.

3.3. Global Positioning and Industrial Champions

A third driver of the narrative is the performance of **global champion firms**. Several flagship companies have reinvented themselves for global markets, suggesting select industrial renewal.

Toyota remains the poster child of this process, albeit with controversy. After dominating automaking for decades, Toyota took a famously cautious stance toward electrification. Under CEO Akio Toyoda, Toyota expanded its hybrid models and poured R&D into hydrogen fuel cells, arguing that a single EV-only strategy would "spell job losses" and waste Japan's existing engine expertise (Reuters, 2024a, 2024b). Toyota expects EVs to plateau at ~30% of sales, with the rest a mix of hybrids and hydrogen (Reuters, 2024b). In the short run this strategy has paid off: as global EV growth cooled, Toyota's hybrid-driven profits stayed robust in 2023-24. Its market share in conventional cars remains high. Yet by focusing on hydrogen and hybrids, Toyota risks being left behind if battery EVs ultimately dominate. Critics note Toyota's global EV share is now small and its market share plunged from ~27% in early 2000s to 7% in 2023 (Reuters, 2024a). Thus, Toyota's bet is simultaneously a sign of ambition (pioneering fuel cells) and of risk (potential obsolescence).

Sony is another transformation story. In the 1990s Sony was suffering in electronics; but it regrouped around entertainment and image sensors. Today Sony is a diversified tech-entertainment conglomerate, with strong global positions in game consoles (PlayStation), imaging sensors (used in smartphones), and music/movies. These segments have driven recent growth: for example, in mid-2024 Sony reported a 10% jump in operating profit thanks to booming image sensor sales and stable game revenues (Reuters, 2024c). Despite record-cash-rich shareholders, Sony's focus on high-margin tech has boosted its share price and global relevance. Sony's success contrasts sharply with domestic-only companies: it illustrates how targeting global tech trends (smartphones, digital entertainment) can yield growth even as Japan's home market stagnates.

In robotics and precision manufacturing, Japanese firms continue to excel internationally. Companies like **Fanuc** (industrial robots), **Yaskawa**, and **Nidec** remain world leaders. Japan accounts for roughly 46% of the global market for industrial robots (JETRO, 2023). This leadership is critical given Japan's demographic challenges. Anecdotally, mid-sized manufacturers report record plans to invest in automation (up 17.5% in FY2023 (Reuters, 2018)), and robot makers have seen order pipelines rebound. In fact, Fanuc saw its revenue finally rise in early 2018 (7.9% year-on-year) after many quarters of declines (Reuters, 2018). These companies benefit from the structural need to replace retiring workers with machines.

Below is a summary of several illustrative companies, their strategic moves, and outcomes:

Company	Sector	Key Initiatives	Outcome / Notes
Hitachi	Industrial Conglomerate	Sold 22 listed subsidiaries; refocused on rail/energy/digital	Leaner business; stock up ~18.6% p.a. (last 5 years)
Olympus	Medical Equipment	Invited Value Act advisor; overhauled governance; sold camera biz	Operating margins >20%; shares ~3x since 2019 vs Topix +30%
Toyota	Automotive	Global hybrid/EV leadership; R&D in H ₂ fuel cells	World's top automaker, but Japanese output -7.3% y/y (Jan--Nov 2024) facing intense foreign competition.
Sony	Electronics/Entertainment	Pivot to games, music content; cut hardware R&D conflicts	Record profit ¥1.14T (FY2024); hardware units (PlayStation 5, sensors) stagnating
SoftBank	Telecom/Tech Investment	Building AI infrastructure (data centers, LLMs); SB-OpenAI JV	Leading AI initiatives (AI Agents, Japanese LLMs) mixing telecom ops with Vision Fund tech bets.
Mizuho	Banking/Finance	Fintech SME lending platforms; startup fund; AI credit analysis	Pioneering SME fintech in Japan; launched AI-driven loan funds (¥14.3B)
Fanuc	Robotics	Industrial robots with AI improvements	Japan's #1 in robots; robust exports (IMF, 2018); but economy-wide productivity still low (services only ~½ of US)

Table.2 Major Japanese Firms: Sectoral Roles, Key Strategic Initiatives, and Outcomes. *Source: Table compiled by author from various sources and analysis*

Each of these cases shows both progress and limitations. Hitachi and Olympus demonstrate how governance and strategic focus can transform traditional Japanese firms. Toyota and Sony illustrate that global competitiveness is alive, yet domestic markets have cooled. SoftBank and Mizuho exemplify Japan's thrust into the digital/AI economy. And Fanuc symbolizes Japan's high-tech excellence alongside broader structural issues.

However, these industrial successes are sector-specific. Japanese dominance is clear in autos, robotics, precision machinery, and certain electronics (sensors, cameras). By contrast, industries centered on domestic consumption, retail, hospitality, healthcare, show no comparable revival. Japan's giant service sector (which employs ~70% of workers) suffers low productivity growth and heavy regulation.

For example, **lodging and services** remain highly fragmented, and many restaurants/small retail outlets still lack digital tools. Although anecdotal advances exist (robot hotels, digital-only banks), overall the "consumer AI" and service startup scene in Japan is weak compared to the U.S. or China. In sum, Japan's industrial reinvention has been *selective*, big manufacturing champions have repositioned globally, but broad-based innovation in services and domestic niches is still missing.

3.4. Policy Support and Innovation Push

Japan's economic policy has also aimed to stimulate innovation and investment. The three "arrows" of Abenomics (2013--2020) mixed fiscal stimulus, monetary easing, and promised structural reforms. The monetary and fiscal moves (huge money printing, deficit spending) temporarily buoyed markets, but growth remained modest (~0.9% annually under Abe) and inflation barely budged (Al Jazeera, 2022a). The structural "third arrow" had spotty success: corporate taxes were cut and deregulation attempted, but many vested interests resisted change (Al Jazeera, 2022b). Corporate governance and labor reforms were introduced only gradually. Thus, while Abenomics signaled new resolve, its net impact on industrial renewal was limited.

More recently, the Kishida government has doubled down on "industrial policy." It has increased R&D budgets, offered subsidies for cutting-edge sectors, and actively courted foreign tech (e.g. attracting TSMC's chip plant). For example, the government launched an "AI strategy" and created a Digital Agency to push digitalization. SoftBank's Vision Fund (backed by the state and pension funds) funneled ~\$100 billion into global tech startups, ostensibly to build Japan's tech ecosystem. However, SoftBank's record is mixed: a series of high-profile losses (e.g. WeWork) highlighted that much of this capital flowed overseas, with few obvious spin-offs for Japan's own industries. Likewise, Kishida's energy policies (increasing renewables, considering nuclear restarts) respond to pressing needs but have yet to dramatically lower Japan's chronically high electricity costs.

Policy support has tended to be **permits and capital** rather than immediate innovation engines. Government incentives and public-private projects have targeted semiconductors, batteries, AI, and biotech. For example, in 2023 Japan pledged 15+ trillion yen to double domestic chip output by 2030. Yet building a self-sufficient tech industry takes time; many initiatives (like the Rapidus chip consortium) are in early stages. Critics argue that much of the recent stock-market exuberance is a result of easy money and optimistic policies, rather than an underlying technological leap.

4. The Digital and AI Dilemma

4.1. Digital Transformation (DX)

One glaring weakness in Japan's recovery is its **digital transformation (DX)** gap. Japan lags behind peers in adopting digital technologies, despite the need to offset labor shortages. Studies find that both government and private sectors show "comparatively low maturity" in DX (EU-Japan Centre, 2022). Large corporations (banks, carmakers) have begun IT upgrades, but small and medium enterprises, which make up 90% of firms are far behind. An EU-Japan analysis highlights that DX in Japan is led by big firms, while SMEs struggle with even basic e-commerce and cloud adoption (EU-Japan Centre, 2022). Japan ranks poorly on global digital indices (e.g. #28 in IMD's 2021 digital competitiveness) and trails in areas like telemedicine (5% usage), mobile banking (6.9% penetration) and AI conference papers (6% share).

Persistent legacy issues are well-illustrated by the banking sector. Mizuho Financial Group, one of Japan's largest banks, suffered repeated system failures in 2002, 2011, and 2021. Despite spending over \$3.6 billion on an overhaul, Mizuho's servers crashed again in 2021, paralyzing transactions for days. Investigations pointed to cultural causes: an entrenched "old guard" mentality, staff rotations that prevented institutional learning, and a risk-averse culture that "discouraged employees from speaking up" (Reuters, 2021a, 2021b). Regulators ultimately demanded the resignations of Mizuho's top management. This case underscores a deeper problem: Japan's corporate culture often resists the trial-and-error and rapid iteration needed for IT projects.

The government has taken notice. In 2021 it launched the Digital Agency with the ambitious mission of "digitizing everything" in government services and enabling private-sector innovation. Yet progress is slow. For example, during the COVID-19 pandemic Japan struggled to deliver online stimulus benefits or vaccination registrations efficiently. Surveys show that over 80% of Japanese firms are uncertain about their DX strategies, and many cite lack of talent and legacy constraints as barriers. As one executive put it, "old IT simply cannot keep up with new needs".

In summary, Japan's DX trajectory is worrisome. While the global champions above (Toyota, Sony, Fanuc) embed digital tech in manufacturing, the rest of the economy remains analog. If Japanese industry is to modernize beyond capital reallocation, it needs broad-based digital adoption. Without it, productivity gains will stall. This makes digitalization a critical fault line in the "resurgence" story.

4.2. Artificial Intelligence (AI)

Japan's position in the AI revolution is mixed. In industrial AI, Japan excels. Its robotics firms (Fanuc, Kawasaki, Yaskawa) and manufacturers are applying AI-driven automation aggressively to offset labor decline (JETRO, 2023; Reuters, 2018). An example is Fanuc's two-armed robot for factory use, which selling well to sectors from food to pharmaceuticals. The government's "Moonshot" R&D goals explicitly aim to merge AI and robotics by 2050 (e.g. autonomous learning robots) (JETRO, 2023). These efforts could reinforce Japan's strengths in factory automation and elderly care robots as demographics worsen.

However, in **consumer/digital AI** online platforms, software, data-driven services Japan lags badly. There are virtually no Japanese equivalents of global AI giants like Google, Amazon, or Tencent. The best known Japanese "AI" successes are narrow (e.g. line-dancing robots,

language translation apps) rather than massive platforms. Japan's tech scene has not produced any unicorns of Silicon Valley scale (startups in Japan remain underfunded). Many observers note that Japan remains in a "leading without followers" mode: it has advanced hardware but misses the disruptive software-centric trajectories pioneered by Silicon Valley (Carnegie Endowment, 2024). As the Carnegie Endowment notes, 1990s shifts to software left Japanese firms at a disadvantage because they were weak in consumer-facing platforms (Carnegie Endowment, 2024). This legacy persists in AI: for example, Japan's share of global semiconductor *design* (a proxy for advanced AI chip development) is only 9%, far behind the U.S. (51%) (Kaplan, 2025), despite huge capital commitments.

Thus, Japan's AI landscape is dichotomous. Its industrial base, robotics, sensors, machinery, is integrating AI to good effect, supporting productivity and export strength. But the country's consumer and enterprise software industries have yet to join the AI gold rush. With AI poised to reshape many sectors, this gap could become a long-term structural risk. Without breakthroughs in software or data, Japan risks ceding future markets to foreign technology companies, limiting the sustainability of today's corporate gains.

5. Indicators of Success: Beyond the Stock Market

5.1. Financial Metrics

The most visible evidence of a revival has been financial-market performance. The Nikkei 225 hitting record highs (above 40,000) and a 28% gain in 2023 (Lardieri & Cloutes, 2024) suggest that investors are finally rewarding Japanese firms. Consistent with this, Japan's MSCI equity index returned about +21% (local) in 2024 (J.P. Morgan Asset Management, 2025), far outpacing stagnant Western markets. Foreign money has poured in: analysts note that Japanese equities were "among the hottest buys" recently as foreigners rushed to capitalize on a weak yen and governance reforms (Lardieri & Cloutes, 2024). Institutional flows turned positive after decades of outflows.

Profitability has also improved. Corporate earnings per share have grown briskly in recent years (helped by a weaker yen boosting overseas profits) (J.P. Morgan Asset Management, 2025). Dividends and share repurchases are at post-1990 highs, evidence that companies are reallocating cash to shareholders rather than idle treasuries (J.P. Morgan Asset Management, 2025). Some companies, especially those with outside pressure, have publicly pledged to spend down excess cash and reduce cross-share holdings. For instance, major insurers have committed to unwinding cross-ownership stakes following FSA encouragement (J.P. Morgan Asset Management, 2025). By 2024 the Tokyo Stock Exchange had published "quality" lists highlighting nearly 815 firms disclosing capital efficiency plans (49% of Prime-listing) (J.P. Morgan Asset Management, 2025), further signaling a change in corporate practice.

Yet important caveats remain. Although profits rose, aggregate **ROE** (return on equity) has not leapfrogged as dramatically. JP Morgan reports that despite ten years of strong EPS growth, Japan's average ROE is still only about 10% (J.P. Morgan Asset Management, 2025), far below the double-digit ROEs typical of efficient economies. In part this is because the equity base has grown (cash and assets piled up), keeping ROE down. In a healthy rebound, one would expect rising ROE; its stagnation implies many companies still have too much idle capital.

5.2. Industrial Competitiveness

Financial metrics alone do not capture industrial strength. We examine other indicators: productivity, export shares, and innovation output.

On productivity growth, Japan underperforms peers. Over the past decades (even pre-pandemic), Japan's labor productivity growth was low by advanced-economy standards (Kumakura, 2022; IMF, 2019). In fact, for nearly 50 years Japan's productivity has languished at the bottom of G7 rankings (Kumakura, 2022), and the gap with the U.S. is widening (currently ~58% of U.S. level (Kumakura, 2022)). The IMF highlights that sluggish productivity in Japanese SMEs especially has been "a drag on Japan's overall productivity growth" (IMF, 2019). Enhancing productivity, therefore, remains a crucial challenge.

In export markets, Japan retains strengths in a few core sectors but not uniformly. It remains a world leader in **industrial robots** (46% global market share (JETRO, 2023)) and is home to major semiconductor equipment and materials companies (e.g. Tokyo Electron, Advantest, Shin-Etsu). Automotive exports still number in the millions of vehicles annually, with Toyota and others highly competitive globally. However, Japan's share in cutting-edge semiconductors is modest: domestic companies produce very few logic chips (a new Rapidus venture is just starting) and, as noted, Japan's semiconductor design market share is only ~9% (Kaplan, 2025). Overall, Japan's high-tech exports are concentrated in hardware and components, not in software or digital services.

Innovation outputs show a similar pattern. According to the Global Innovation Index 2024, Japan ranks about 13th overall, but it performs better on inputs (R&D spending, education - 12th) than on outputs (commercialized innovation -14th) (WIPO, 2024). Japan files many patents (especially in chemistry and machinery) but scores lower on measures like start-up vibrancy and venture capital. For example, its "startup economy" has only a dozen unicorns, far behind the US or China (EU-Japan Centre, 2022). In sum, Japan still generates technological knowledge, but translating it into new global products/services is weaker.

Finally, **patent intensity** and other innovation metrics have mixed signals. Japan continues to have world-class research in sectors like automotive, robotics, and semiconductors. But the slow drift in global tech leadership -- noted in Case **Toyota** and **Sony** above , suggests the pace of breakthrough innovation is less dramatic than in the 1980s. The nation's patent pipeline and industrial R&D spending remain high, but critics point out that too many innovations stay within Japan's closed market.

5.3. Distributional Reality

All of the above points underscore a widening gap, between a few high-performing firms and the rest. On one side are "star" companies (Toyota, Sony, Fanuc, etc.) which show growth, global competitiveness, and investor appeal. On the other side is the mass of small and mid-sized companies that do not share in the recovery. Japanese SMEs suffer chronic low productivity: their output per worker has been essentially flat for a decade (IMF, 2019), while large firms have seen gradual improvements. Moreover, services and local industries (retail, hospitality, local construction, healthcare) show little innovation or export growth.

This duality also appears in regional and social terms. Urban, export-oriented sectors in Tokyo, Aichi, and Osaka drive national stats, whereas depopulating rural areas struggle. Similar-

ly, shareholders in big firms enjoy gains, but many ordinary workers in stagnant firms see little wage growth. Indeed, rising stock prices have not yet translated into broad-based income gains or inflation (wages in Japan have grown slowly despite labor shortages). Thus, the myth of "Japan's revival" is seen as too favorable to corporate insiders; for the typical citizen and small business, life is not much different.

6. Analysis

In light of these findings, we must critically assess the mainstream narrative of Japan's corporate resurgence. The overarching critique is that *financial resurgence* is not the same as *industrial renewal*. Stocks can rally on top-line optics even if the underlying economy is hollow.

First, the **corporate-industrial divide**: As detailed above, Japan's best companies have indeed modernized and compete globally. But the improvement is *narrowly based*. A handful of global champions lead their industries, but the vast majority of Japanese companies (especially domestically-focused SMEs and services) remain weak. For example, while Toyota, Sony, and robot makers invest in next-generation products, most Japanese consumer brands have little presence abroad. Similarly, dozens of publicly listed firms still trade at $PBR < 1$ (Financial Services Agency, 2023), meaning the market sees no value above book, a sign that investors do not see real growth potential across the board.

Second, **selective success**: The positives rely heavily on exogenous factors. The stock rally owes much to a yen slump and global liquidity chasing yield. Corporate governance gains owe much to pressure from the TSE and foreign activists (Reuters, 2023a; Reuters, 2025). In many cases, companies implemented reforms only to avoid penalties or public shaming. For instance, the TSE's threats of delisting spurred numerous companies to announce buybacks or board changes, but actual shareholder returns vary widely. The macro numbers (stock index, corporate profit totals) hide the distributional reality that success stories are clustered at the top.

Third, **structural risks** loom large. A critical one is **demographics**. Japan's population peaked ~2010 and has already fallen from 128 million to about 125 million; projections indicate it could fall below 100 million by 2050. This inexorable shrinkage undermines domestic demand in many industries (housing, consumer goods, services). Even with globalization, a declining home market constrains growth. Energy and resource security are another fragility. After the Fukushima disaster, Japan turned away from nuclear and now imports most of its fossil fuels; this raises production costs and trade deficits (especially with recent global energy volatility). Both demographics and energy issues impose long-term headwinds that no corporate governance code can solve.

Another risk is the **digital/AI gap**. If Japan fails to keep pace in high-growth domains (cloud computing, AI-driven services, biotech, e-commerce), it may lose ground permanently. Already, the country is a minor player in cloud platforms or social media, which is itself a competitive disadvantage. The lack of strong domestic digital champions suggests that, outside of its traditional industries, Japan might become a technology follower.

Lastly, **fragility of reforms**: Many of the corporate gains appear externally imposed. Activist campaigns, regulatory exhortations, and stock index incentives are driving change, but

internalizing these values is another matter. The experience of past reforms (post-bubble governance codes) is that initial compliance later slipped. If activist fervor subsides or TSE rules loosen, companies might revert to old habits. Academics warn that true transformation requires cultural change, not just institutional mandates (Asanuma, 2023). Without embedding a genuine shareholder mentality, gains in ROE or PBR may prove ephemeral.

Synthesizing the above, the picture that emerges is: **Japan's corporate resurgence is real but narrow, externally driven, and potentially fragile.** On the positive side, governance reforms and market pressures have shaken Japanese capitalism out of years of inertia. Boards have diversified, ROEs are trending up (albeit slowly), and managers no longer feel completely shielded from investor judgment. The stock market boom shows newfound capital confidence in Japan.

However, the strategic lesson is caution. Focusing solely on governance and capital efficiency, while ignoring technological and productive transformation, risks creating a cosmetic rebound. Japan's experience suggests that policy-driven governance reform can deliver short-term gains (as also seen in Europe or Korea when they liberalize corporate rules). But without genuine industrial competitiveness, these gains "buy time" rather than assure long-run prosperity. The analogy often drawn is that investors may have succeeded in "waking up the sleeping giant" but the giant's next challenge is learning new skills.

For other aging advanced economies (say, Italy or Germany), Japan offers a case study. It shows that shareholder-friendly reforms and activist pressure can boost corporate profitability even amidst slow population growth. But it also shows the limits: without innovation and digital leadership, the old structural constraints remain. In that sense, Japan teaches that reforms boosting capital allocation are necessary but not sufficient. True renewal ultimately depends on developing new technologies and expanding into new markets.

7. Conclusion

In conclusion, Japan's recent corporate achievements are best understood as a **bifurcated phenomenon**. A small set of large, globalized companies have indeed undergone significant repositioning, emerging more streamlined, more profitable, and attuned to shareholder value. Meanwhile, most of domestic Japan's firms (particularly small and service-sector businesses) continue as before. The stock market's euphoria reflects the former, not a nationwide revival.

Thus, the narrative of a national "resurgence" is partly a mirage. It is "substance" in the sense that Japan's corporate governance and financial metrics have improved; but it is also "spectacle" because this story has been heavily amplified by optics (activist narratives, government campaigns, roaring stock tickers). Unless the gains of the few spread through innovation and productivity across the economy, the story will remain one of selective corporate success, not broad-based renewal.

Looking forward, Japan's long-term sustainability hinges on bridging this divide. If the country can leverage its healthy corporate balance sheets to invest in digital transformation, AI, and new tech, then the current momentum might seed deeper growth.

Bibliography

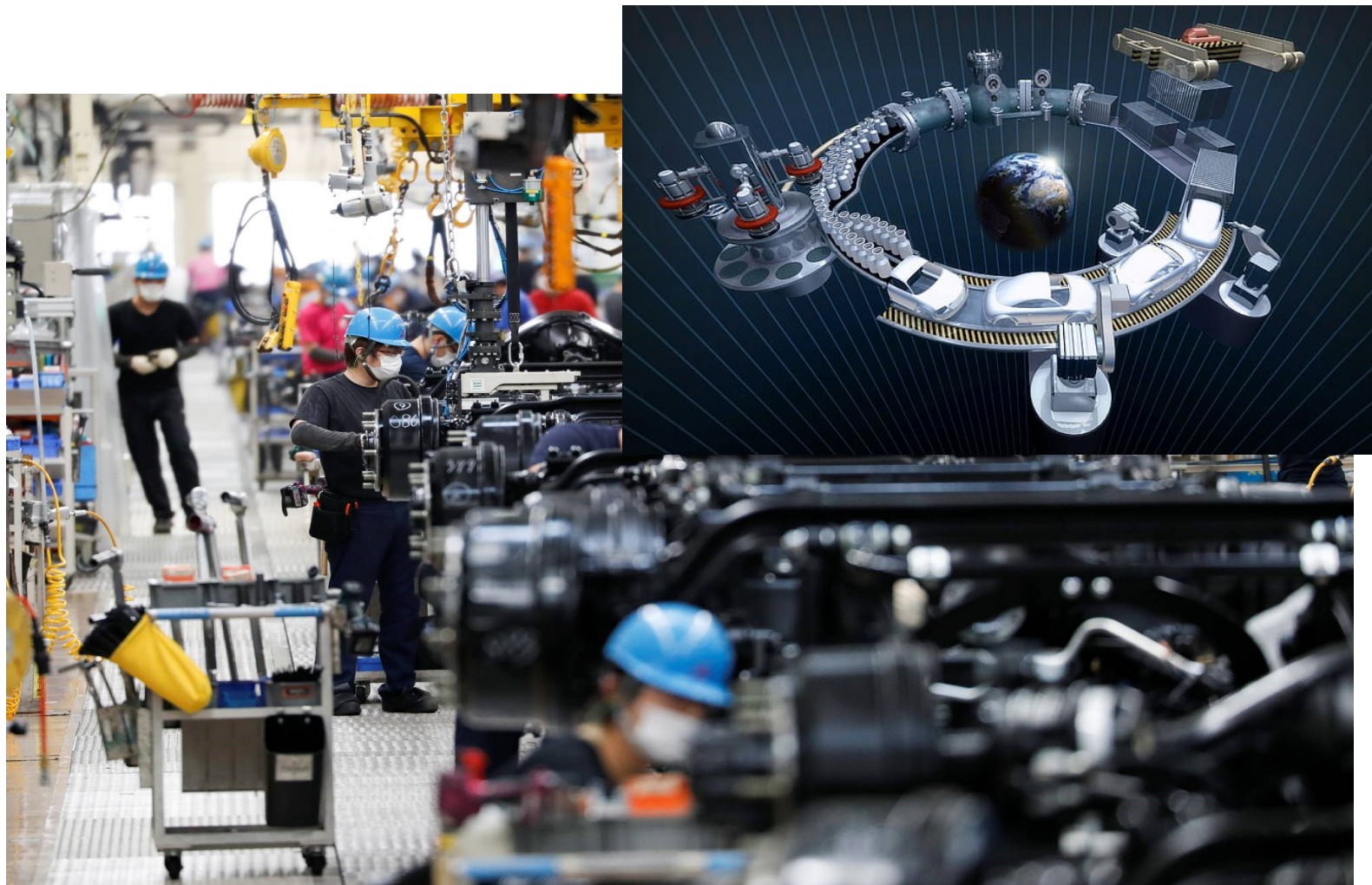
- AI Invest. (2025). *Mizuho strategic expansion Japan startup lending private credit markets catalyst Asian financial innovation*. <https://www.ainvest.com/news/mizuho-strategic-expansion-japan-startup-lending-private-credit-markets-catalyst-asian-financial-innovation-2507/>
- Asanuma, S. (2023). Why capital pressure fails to transform Japan: Structure, mindset, and strategic recalibration for investors. *Medium*. <https://medium.com/@shintan.asanuma/why-capital-pressure-fails-to-transform-japan-structure-mindset-and-strategic-recalibration-for-6703827daacb>
- Carnegie Endowment for International Peace. (2024, October). *Japan's aging society as a technological opportunity*. <https://carnegieendowment.org/research/2024/10/japans-aging-society-as-a-technological-opportunity?lang=en>
- EU-Japan Centre for Industrial Cooperation. (2022). *Digital transformation in Japan: Assessing opportunities for EU SMEs*. <https://www.eu-japan.eu/sites/default/files/publications/docs/Digital-Transformation-Japan-Assessing-opportunities-forEU-SMEs.pdf>
- Financial Services Agency. (2023). *Japan's Corporate Governance Forum* (No. 6). https://www.fsa.go.jp/singi/japan_corporate_governance_forum/06.pdf
- Hermes Investment. (2023, July). *EOS quarterly: Japan governance reforms Q2 2023*. <https://www.hermes-investment.com/uploads/2023/07/590689ec21b45db4ed3cd36c9027c541/eos-per-japan-reforms-q2-2023.pdf>
- IMF. (2018, June 12). Chart of the week: Japan's robots. *IMF Blog*. <https://www.imf.org/en/Blogs/Articles/2018/06/12/chart-of-the-week-japans-robots>
- IMF. (2019, July). *Productivity drag from small and medium-sized enterprises in Japan* (Working Paper No. WP/19/137). <https://www.imf.org/-/media/Files/Publications/WP/2019/WPIEA2019137.ashx>
- ISS Governance. (2025). *2025 Japan proxy season preview*. <https://insights.issgovernance.com/posts/2025-japan-proxy-season-preview/>
- J.P. Morgan Asset Management. (2025). *Japan's corporate reforms boost shareholder value in 2025*. <https://am.jpmorgan.com/fi/en/asset-management/adv/insights/etf-perspectives/japan-corporate-governance-shareholder-value/>
- JETRO. (2023). *Attractive markets: Manufacturing - Industries*. https://www.jetro.go.jp/en/invest/attractive_sectors/manufacturing/attractive_markets.html
- Kaplan, R. (2025, March 21). Japan semiconductor design market share drops to 9%. *Szyunze Tech*. <https://www.szyunze.com/japan-semiconductor-design-market-share-drops-to-9/>
- Kumakura, M. (2022, January 7). Japan's labor productivity remains low. *Nippon.com*. <https://www.nippon.com/en/japan-data/h02240/>
- Kyodo News. (2019). Meanwhile Japan saw its labor productivity at services only half of United States the group said. <https://english.kyodonews.net/articles/-/51902?phrase=older&words=>
- Lardieri, A., & Cloutes, A. (2024, March 4). Japan's benchmark Nikkei index passes 40,000 for first time in history. *Al Jazeera*. <https://www.aljazeera.com/economy/2024/3/4/japans-benchmark-nikkei-index-passes-40000-for-first-time-in-history>
- Newton Investment Management. (2023). *Japan investment implications of corporate govern-*

- ance reforms. <https://www.newtonim.com/us-institutional/insights/blog/japan-investment-implications-of-corporate-governance-reforms/>
- OECD. (2025, July). *OECD employment outlook 2025: Japan*. https://www.oecd.org/en/publications/2025/07/oecd-employment-outlook-2025-country-notes_5f33b4c5/japan_fa8fbc74.html
- Reuters. (2011, August 3). Hitachi marks end of an era with TV outsourcing plan. <https://www.reuters.com/article/idUSL3E7J309Z/>
- Reuters. (2012, January 6). Woodford to sue Olympus, drops leadership bid. <https://www.reuters.com/article/business/woodford-to-sue-olympus-drops-leadership-bid-idUSTRE80523Q/>
- Reuters. (2018, May 7). Desperately short of labor, mid-sized Japanese firms plan to buy robots. <https://www.reuters.com/article/business/desperately-short-of-labor-mid-sized-japanese-firms-plan-to-buy-robots-idUSKCN18B01Y/>
- Reuters. (2019a, March 15). Japan's Olympus to propose board seat for activist investor ValueAct. <https://www.reuters.com/article/us-olympus-valueact/japans-olympus-to-propose-board-seat-for-activist-investor-valueact-idUSKCN1P50EN/>
- Reuters. (2019b, March 15). Activist investment is gaining momentum valuable spur to economic growth. <https://www.reuters.com/article/us-olympus-valueact/japans-olympus-to-propose-board-seat-for-activist-investor-valueact-idUSKCN1P50EN/>
- Reuters. (2021, April 21). Japan Inc activist investors come cold. <https://www.reuters.com/business/finance/japan-inc-activist-investors-come-cold-2021-04-21/>
- Reuters. (2021a, June 15). Mizuho's corporate culture to blame for serial system failures, probe finds. <https://www.reuters.com/world/asia-pacific/mizuhos-system-failures-caused-by-corporate-culture-third-party-probe-says-2021-06-15/>
- Reuters. (2021b, November 26). Japan's finance ministry takes punitive action vs Mizuho over forex law. <https://www.reuters.com/business/finance/japans-finance-ministry-takes-punitive-action-vs-mizuho-over-forex-law-2021-11-26/>
- Reuters. (2023a, October 2). Shareholder proposals gain traction in Japan as activism thrives. <https://www.reuters.com/markets/asia/shareholder-proposals-gain-traction-japan-activism-thrives-2023-10-02/>
- Reuters. (2023b, October 2). Activists were long viewed as for their proposals on merit. <https://www.reuters.com/markets/asia/shareholder-proposals-gain-traction-japan-activism-thrives-2023-10-02/>
- Reuters. (2024a, October 10). Shift to EV-only future would spell job losses, Toyota chairman warns. <https://www.reuters.com/business/autos-transportation/shift-ev-only-future-would-spell-job-losses-toyota-chairman-warns-2024-10-10/>
- Reuters. (2024b, October 10). It champions what it calls vehicles and other powertrain technology. <https://www.reuters.com/business/autos-transportation/shift-ev-only-future-would-spell-job-losses-toyota-chairman-warns-2024-10-10/>
- Reuters. (2024c, August 7). Sony posts 10% profit rise on image sensors, games boost. <https://www.reuters.com/technology/sony-posts-10-profit-rise-q1-image-sensor-games-strength-2024-08-07/>
- Reuters. (2025, July 2). Management booted out as Japan's shareholders flex their muscles in AGMs. <https://www.reuters.com/sustainability/sustainable-finance-reporting/management-booted-out-japans-shareholders-flex-their-muscles-agms-2025-07-02/>

Innovation, Tradition & Society

Balancing Progress with Societal Development

- 1) **The Economic and Societal Reverberations of Japan's Pop Culture Boom**
Emmanuel Selva Royan.....Pg.61
- 2) **Inclusive and Sustainable Growth:
Institutional and Technological Innovations in India and Japan**
-Prabha NarayanaPg.81





The Economic and Societal Reverberations of Japan's Pop Culture Boom

Abstract:

Japanese manga, anime, and video games have evolved into powerful engines of global cultural influence, reshaping entertainment industries and international perceptions of Japan. Their success reflects a unique balance between commerce and creativity, as noted by Kelts (2007), and is reinforced by striking economic achievements. By the mid-2020s, the combined anime and manga market reached USD 28.5 billion, while franchises such as Mario and Pokémon secured enduring international recognition. Notably, overseas revenues for anime surpassed domestic earnings in 2023 (Handjaja, 2024), signaling the depth of global demand. Beyond financial impact, these cultural exports exemplify Japan's exercise of soft power, subtly shaping global values, aesthetics, and engagement with Japanese identity.

This paper explores how Japanese pop culture functions simultaneously as a tool of soft power, a driver of commercial innovation, and a framework for cultural exchange, offering insights into the future dynamics of global media production and consumption.



EMMANUEL SELVA ROYAN

Research Associate,
Mizuho India Japan Study Centre
Indian Institute of Management
Bangalore

Index of Content

1. Introduction
2. Academic and Industry Assessments
3. Analysis
 - 3.1. Soft Power and Cultural Influence
 - 3.2. Commerce and Creativity
 - 3.3. Societal Impact
 - 3.4. The “Japanese Model”—Is It Exportable?
4. Conclusion and Future Outlook

1. Introduction

In recent decades, Japanese manga, anime, and video games have emerged as some of the most influential forces in global popular culture. This dynamic trio of creative industries has not only reshaped entertainment across continents but also redefined how nations perceive and interact with Japan. As Roland Kelts notes, "The Japanese model offers the West a dynamic example of how to combine commerce and creativity," underscoring the synergy that lies at the heart of Japan's pop-cultural success (Kelts, 2007). The phenomenon's economic footprint is substantial. By the mid-2020s, the global market for anime and manga alone was worth an estimated USD28.5 billion, with major video game franchises like Mario and Pokémon achieving household-name status internationally. Industry analytics indicate that overseas revenue for Japanese anime surpassed domestic earnings by 2023, highlighting the sustained appetite for Japanese media beyond its borders (Handjaja, 2024). Yet, the global rise of Japanese pop media is not just a story of economic and commercial triumph. It is also a profound exercise in soft power—a nation wielding cultural appeal to influence the world in subtle ways, far beyond the realm of traditional diplomacy.

This paper examines the global impact of Japanese pop culture exploring its multifaceted roles as a source of soft power, a driver of commercial innovation, and a catalyst for both societal and worldwide success. In doing so, the paper contributes to ongoing debates about the future of cultural production, consumption, and exchange in an increasingly interconnected world.

2. Academic and Industry Assessments

The global impact of Japanese pop culture has become a major subject of academic inquiry and industry analysis. Scholars from media studies, sociology, economics, and cultural studies have examined how anime, manga, and games function as both cultural products and economic drivers. Meanwhile, industry analysts track the evolving business models, international partnerships, and market trends that shape the future of Japanese pop culture.

2.1 Academic Perspectives

Academics have explored Japanese pop culture as a form of "soft power" (Nye, 2004; Weng, 2025), a tool for nation branding (Lam, 2007), and a site of identity formation for both Japanese and global youth (Liu et al., 2022; Fennell et al., 2013). The "Cool Japan" initiative, launched by the Japanese government in the early 2000s, is often cited as a deliberate attempt to leverage pop culture for diplomatic and economic gain (Weng, 2025). Scholars debate the effectiveness of this strategy: some argue that organic, grassroots fandoms have done more to spread Japanese culture than top-down government campaigns (Lam, 2007; Weng, 2025).

Research also highlights the complexity of cultural flows. Rather than a simple one-way export, Japanese pop culture is shaped by transnational collaboration, fan participation, and local adaptation (Ohsawa, 2015; Fennell et al., 2013). Theories of "cultural odorlessness" (Iwabuchi, 2002) suggest that some Japanese media succeed globally because they downplay specifically Japanese elements, making them more universally relatable. Others argue that the distinctiveness of Japanese aesthetics and storytelling is precisely what attracts global audiences (Fennell et al., 2013).

Sociological studies have examined the psychological and social effects of pop culture consumption, as discussed in previous sections (Yamak & Işık, 2024; Hajek & König, 2024; Liu et al., 2022). There is growing interest in the role of fan communities, both online and offline, in shaping identity, fostering social connections, and even driving activism (Weng, 2025). The rise of “prosumer” culture—where fans not only consume but also create derivative works (fan art, fan fiction, cosplay)—is seen as a hallmark of contemporary media engagement (Ohsawa, 2015).

2.2 Industry Assessment

From an industry perspective, Japanese pop culture is a multi-billion-dollar global business. The anime industry alone was valued at over USD24 billion in 2023, with overseas revenues surpassing domestic sales for the first time (Handjaja, 2024). Major studios and publishers have formed partnerships with global streaming platforms (e.g., Netflix, Crunchyroll, Disney+) to reach wider audiences and secure new revenue streams. This has led to increased investment in high-quality productions, but also intensified competition and concerns about overproduction and labor exploitation (Oto, 2025).

The business model of Japanese pop culture is evolving. Traditionally, production committees—consortia of publishers, broadcasters, toy companies, and ad agencies—have controlled the financing and distribution of anime and related media. This model spreads risk but can limit creative freedom and concentrate profits among corporate stakeholders rather than creators (Weng, 2025). The rise of global streaming has begun to disrupt this system, with international platforms sometimes funding productions directly and demanding exclusive rights (Handjaja, 2024). This shift has both positive and negative implications: it can provide more resources and global exposure for creators, but may also lead to creative decisions being driven by international market trends rather than domestic innovation (Weng, 2025).

Industry analysts also note the increasing importance of “media mix” strategies—integrated campaigns that span anime, manga, games, merchandise, live events, and more. Successful franchises like Pokémon, Demon Slayer, and Attack on Titan generate revenue across multiple platforms and product lines, creating a synergistic effect that amplifies their global reach (Handjaja, 2024).

Despite its success, the Japanese pop culture industry faces significant challenges. Labor exploitation, as discussed earlier, remains a pressing issue (Oto, 2025). The industry is also grappling with demographic shifts: Japan’s aging population and declining birthrate mean a shrinking domestic audience, making international markets ever more crucial (Handjaja, 2024). There is concern that the drive for global appeal could dilute the distinctiveness of Japanese content, leading to more generic productions aimed at the broadest possible audience.

On the academic side, scholars call for more nuanced, intersectional analyses that consider gender, race, class, and other factors in the production and consumption of pop culture (Weng, 2025). There is also a push to study the experiences of creators and workers, not just fans and consumers, to better understand the human costs and benefits of the industry’s global boom (Oto, 2025).

Therefore, academic and industry analyses reveal both the extraordinary achievements and the ongoing tensions within Japanese pop culture's global expansion. The field remains dynamic, with new trends, technologies, and debates continually reshaping the landscape.

3. Analysis

The global rise of Japanese pop culture particularly anime, manga, and gaming—has transformed not only media landscapes but also the ways nations exert influence, generate economic value, and navigate cultural dynamics in the 21st century. What began as niche fandoms in the 1980s and 1990s has exploded into a global phenomenon since 2000, shaping how Japan engages with the world and how the world responds to Japanese content. This research section explores the multilayered dimensions of that expansion, from geopolitics to economics, from societal effects to cultural friction.

First, we investigate the role of soft power and cultural influence, unpacking how Japan has leveraged entertainment to project national identity and values, and how this compares to traditional statecraft. Then, we analyse the intersection of commerce and creativity, focusing on who economically benefits from Japan's global cultural success and whether its distinctive business models can be exported or replicated.

We also address the societal impacts of pop culture proliferation. This includes both domestic implications such as labour conditions and mental health—and the broader global implications for youth identity and social behaviour. Finally, we examine the dynamics of local adaptation and glocalization, including the reception and reshaping of Japanese content abroad, and the geopolitical tensions sparked by Japan's growing cultural reach. These include concerns from neighbouring countries about media dominance and its potential to overshadow local voices.

Together, these topics provide a comprehensive lens to assess the strategic, economic, and cultural weight of Japan's pop culture industries in a global context.

3.1 Soft Power and Cultural Influence

Japanese pop culture—manga, anime, and video games—has indeed become a form of *soft power*, shaping global perceptions and contributing to Japan's positive image. For example, Miki Sakuma highlights enduring cultural appeal in France, noting both current student enthusiasm and deep historical ties, such as Japonisme in the 19th century. However, both Sakuma and Hirasawa caution that this power is "strong but also vulnerable" and may not be entirely reliable for long-term diplomatic goals, as consumer trends can rapidly shift, and similar phenomena (such as K-pop boosting Korean language interest) can alter soft power dynamics quickly (Hirasawa, Kato, & Sakuma, 2024). Japanese pop culture's international popularity is often cited as a source of national soft power—the ability to attract and co-opt through culture rather than coercion (Leheny, 2015). There is no doubt that anime, manga, and video games have given Japan a friendly cultural image globally. For example, Japan's government has actively promoted pop culture through initiatives like the Cool Japan campaign (launched 2012) to improve its national image and diplomacy (Weng, 2025). Beloved characters such as Doraemon have even been appointed "anime ambassadors" to personify Japan's cultural diplomacy (Weng, 2025). As of the mid-2020s, the combined global market for anime and manga was estimated around USD28.5 billion (Handjaja, 2024), and major Japanese video game

franchises (from Mario to Pokémon) are household names worldwide. Hirasawa, Kato, & Sakuma (2024) acknowledges the ongoing growth of the manga, anime, and game markets, both domestically and internationally, driven in part by collaboration and adaptation to new technologies like smartphones and by diverse, globally-oriented production practices. Yet, the appeal and impact are shaped by the interests and engagement of foreign fans and communities, rather than by direct promotion from Japan. Sakuma observes that, just as French interest in Japanese pop culture is deep and historic, it can be vulnerable to shifts in global pop trends (e.g., the rise of K-pop). Both speakers agree that sustained global relevance requires attentiveness to international audiences and openness to cross-cultural (Hirasawa, Kato, & Sakuma, 2024). The question remains: does this pop culture adoration translate into tangible political or diplomatic influence for Japan?

Japanese pop culture exports tend to foster positive perceptions—not always aligned with Japan’s societal realities. According to Sakuma, the charm of characters and distinct aesthetics serve as powerful cultural ambassadors, sometimes overshadowing deeper political or social issues. The popularity of stylized representations (for instance, cosplay inspired by anime characters among European youth) shapes an idealized image of Japan, often disconnected from its complexities. Both experts acknowledge that while pop culture can deepen cultural ties and curiosity, it does not necessarily translate into nuanced or informed understandings of Japan’s politics or society (Hirasawa, Kato, & Sakuma, 2024). Recent analyses suggest a mismatch between popularity and political gains. Political scientist David Leheny argues we should be “highly skeptical” that widespread love of anime and manga “matters for Japan’s diplomacy and global political status.” He notes that despite Japan’s pop culture boom since the early 2000s, there is “precisely no evidence that politics works this way”—i.e., that foreign publics enamored with Japanese media will support Japan’s policy goals out of cultural affinity. For instance, even as anime became hugely popular in the US, Americans did not become more sympathetic to Japan’s contentious stances on historical issues (such as textbook revisions about World War II) (Leheny, 2015). Similarly, a 2012 study found that while overseas anime fandom fosters a “multicultural worldview,” it “does not necessarily equate to soft power in the traditional sense”—consuming Japanese media doesn’t automatically translate to accepting Japan’s governmental views (Fennell et al., 2013). In short, pop culture alone has limits in converting fans into geopolitical friends.

One reason is that historical and political contexts mediate soft power. Japan continues to grapple with negative perceptions in neighbouring countries due to 20th-century militarism and atrocities. Pop culture offers a softer image—as one article put it, Japan has “rebranded” from a “militaristic aggressor” into an “eccentric pop-culture superpower” in the Western imagination (Bain, 2020). Yet unresolved history can blunt cultural charm. A recent study notes that no matter how popular anime and manga become, Japan’s ability to leverage that goodwill is “compromised due to unresolved historical issues,” especially in East Asia (Weng, 2025). For example, cultural outreach has not erased distrust in China or South Korea, where wartime memories linger. Japanese officials themselves acknowledge that pop culture soft power “will be undermined if [Japan] cannot reconcile with past actions,” as inconsistent statements about wartime “comfort women” showed. Thus, soft power has not been a panacea for Japan’s diplomatic frictions.

Moreover, the values in Japanese pop media don't always align with government messaging. Many globally loved anime are creative or even subversive, rather than promoting "traditional" Japanese values. Analysts point out that internationally popular series may not reflect the conservative ideals Tokyo might wish to project (Pace-McCarrick, 2021). In fact, the government's Cool Japan strategy eventually shifted away from pushing any moral or traditional theme and focused on consumer appeal and "branding" Japan as cool. This helped boost exports but meant pop culture's influence is largely commercial, not ideological. As a result, "Japan's soft power may be disconnected from the traditional ideals the government wants to promote," limiting its utility for diplomatic goals (Weng, 2025).

On the positive side, pop culture fame does yield indirect benefits for Japan. It has markedly improved Japan's global image as a creative, modern nation. Survey-based indices (e.g., the Anholt-Ipsos Nation Brands Index) have Japan rising to top ranks in cultural reputation by the 2020s, and the country is often seen as "cool" and technologically advanced—an image owed in part to its entertainment exports (Bain, 2020). Pop culture has also encouraged people-to-people ties: for instance, hit anime films can spark tourism surges. After the blockbuster *Your Name* (2016), an "anime pilgrimage" trend saw fans flocking to real locations from the film, contributing an estimated USD164 million in foreign tourist revenue in 2016 alone (Handjaja, 2024). Japanese officials report that the worldwide popularity of anime/manga has coincided with increases in foreign students and language learners in Japan (Weng, 2025). By attracting fans to engage with Japan's language and locales, pop culture can "foster cultural understanding and mutual appreciation," even if it doesn't directly change foreign policy (Fennell et al., 2013). In this sense, the soft-power gains are more social and economic than strategic: a reservoir of goodwill, a boost in cultural tourism, and an accessible gateway to Japanese culture for millions abroad.

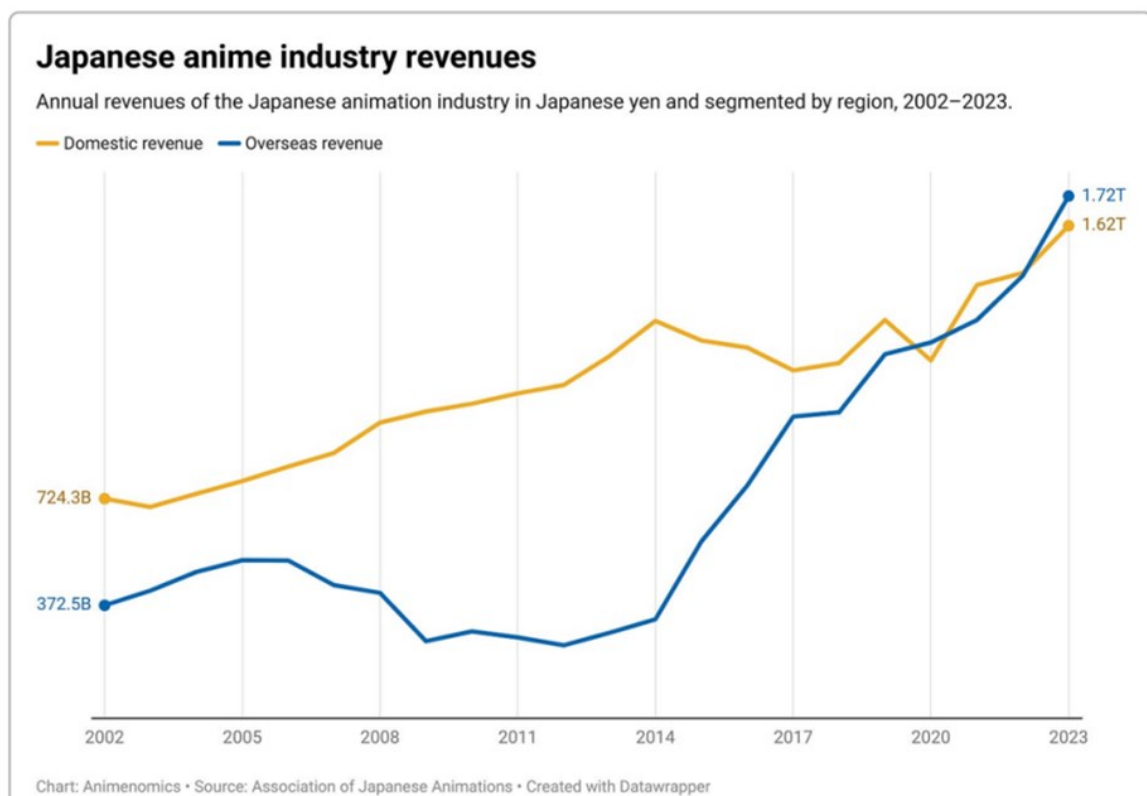


Figure 1: Japanese anime industry revenues by region, 2002–2023. Overseas (blue) revenue has grown sharply since 2015, overtaking domestic (orange) revenue by 2023. This reflects anime's sustained international boom. Source: Association of Japanese Animations.

Figure 1 illustrates how overseas anime revenue (blue line) grew explosively in the late 2010s–2020s, surpassing Japan’s internal market by 2023 (Handjaja, 2024). This sustained growth, alongside long-running franchises like Pokémon remaining globally relevant for 25+ years, indicates that Japanese pop culture’s appeal is not merely a short-lived boom. However, it is a “moving target” in terms of trends—what’s hot in one era (say, Pokémon or Dragon Ball) gives way to new phenomena in the next (like *Demon Slayer* or the latest console games). The form of the appeal continually evolves, but the underlying presence of Japanese media in global entertainment has proven durable.

3.2 Commerce and Creativity

3.2.1 Overview

The worldwide commercial success of anime, manga, and games raises complex questions about the balance between artistic integrity and commercialization, and who reaps the economic rewards of this success. Japanese pop culture industries have become big business globally, but they are also creative fields with artistic traditions. Has the drive for profit diluted the creative or cultural authenticity of these media?

Many observers note that commercial pressures have indeed altered the creative landscape of anime and manga in recent decades. Anime historian John Oppliger bluntly states that “saying that commercialization and hyper-commodification hasn’t compromised the artistic integrity of anime would be incorrect”. Market forces now heavily shape production: studios face demands for “commercially opportune works,” rapid content output, and merchandise-friendly content (Oppliger, 2015). For example, modern anime are often designed to introduce main characters immediately and expand casts broadly—a shift from older storytelling rhythms—because more characters mean more potential merchandise sales. This trend is a departure from the 1980s “golden age” of anime, when a bubble economy allowed studios to experiment with avant-garde, artist-driven projects despite limited commercial appeal (Oppliger, 2015). Japanese production frameworks generally strike a balance between economic gain and creative freedom. Hirasawa emphasizes that creators in Japan benefit from significant legal and economic protections, often receiving meaningful compensation and retaining rights. He suggests that while profit and commercial interests are relevant, Japan’s industry—unlike the more producer-driven U.S. model—still places “creator at the center,” helping preserve artistic integrity. Kato similarly stresses the importance of creators maintaining control, especially as new technologies like AI/ML become integrated into production workflows.

Today, production committees (consortia of investors and rights-holders) carefully calculate returns, and series are frequently crafted to extend multimedia franchises. In short, profit potential is now a dominant driver, influencing everything from narrative pacing to character design in contemporary anime.

Yet, it’s also true that creative quality survives within commercial constraints. Industry veterans argue that despite more formulaic tropes and sequelization, anime and manga still retain artistic merit and cultural uniqueness—which is precisely why they remain globally popular. Even mainstream, highly commercial series often showcase moments of exceptional artistry (e.g., a sakuga scene of fluid animation in a popular shōnen anime) and original, culturally specific storytelling. The continuous global success suggests that Japanese creators have found ways to marry art and commerce: delivering entertaining content that sells, while pre-

serving enough creative identity to distinguish it from homogenized Western entertainment. One could say the “soul” of anime is bent, not broken, by commercialization (Oppliger, 2015). In fact, the very elements that drive sales—engaging characters, rich world-building, emotional storytelling—are also what fans cherish artistically. So, while the balance has shifted toward commercialism, the industry’s output still carries a distinct creative flair that resonates worldwide.

3.2.2 Economic Beneficiaries of Global Success

The explosion of global demand for Japanese pop media since 2000 has generated billions in revenue. A key question is: who benefits economically from this boom? Is it largely Japanese creators and companies, or do international distributors and corporations capture a significant share?

Evidence suggests that while Japanese rights-holders earn substantial income, a web of multinational stakeholders also profit—and the creatives at the ground level sometimes see surprisingly little of the windfall. The anime industry is a prime example. In 2023, anime’s global market size reached a record high, with overseas revenues (YEN 1.72 trillion) slightly exceeding domestic revenues (¥1.62 trillion) (Handjaja, 2024; Parrot Analytics, 2024). This means foreign markets contributed about 51.5% of industry earnings (Handjaja, 2024). Much of that money flows to Japanese production committees (which include domestic publishers, studios, and toy/game companies)—but crucially, it also involves global partners. U.S.-based streaming giants (Netflix, Amazon) and Sony-owned Crunchyroll are now major distributors and financiers of anime, investing in productions and reaping subscription or advertising revenue (Parrot Analytics, 2024). In fact, anime accounted for an estimated 6% of all global streaming content revenue in 2023, and Netflix alone earned overUSD 2 billion from anime streaming, about 38% of anime’s worldwide streaming revenue (Parrot Analytics, 2024). These figures highlight that Western tech and media companies are significant economic beneficiaries of the anime boom. Similarly, in video games, Japanese developers (Nintendo, Sony, Capcom, Bandai Namco, etc.) earn huge sales abroad, but often partner with overseas publishers and platform holders. For instance, Sony’s PlayStation division earns revenue globally, and many Japanese games are distributed in the West by local branches or foreign partners, meaning a slice of profits stays overseas.

Hirasawa highlights that Japan’s system traditionally prioritizes creators, with substantial profits and rights afforded to them, in contrast to “the U.S. kind of approach,” which favors producers and financiers. However, he notes that with increased global collaboration, profit-sharing models are evolving, particularly as projects become more international and involve overseas financing and creative participation. Kato observes that the entire production ecosystem of anime/manga in Japan is distinctive, with different roles, workflow tools, and cultural expectations compared to the Western industry (Hirasawa, Kato, & Sakuma, 2024). The Japanese approach emphasizes individual director influence and close-knit collaboration but would be difficult to replicate wholesale due to differences in industry structure and workplace culture. International projects (such as the anime “Journey” funded by the Middle East) exemplify collaborative hybrids, balancing different working methods. Notably, within Japan’s pop culture industries, there is an imbalance in who profits. Despite record revenue in anime, the financial rewards are not evenly shared. Reports show that “most of the money goes to production committees—corporate groups that include publishers, distributors and

merchandise companies—not the animators themselves” (Oto, 2025). The creators—illustrators, animators, voice actors—often work on a fixed-fee basis with low wages, regardless of a title’s runaway success. In other words, it is usually the companies (including multinational licensees) that see the real economic windfall, whereas many artists remain underpaid. For example, even as anime became a USD 21+ billion industry by 2025, surveys found young animators in Japan earned on average only YEN 1.97 million/year (USD 15k), with about 40% of animators scraping by on USD 16k annually (Oto, 2025). These are near-poverty wages in urban Japan. Meanwhile, corporate profits from character merchandise, overseas licensing, and streaming deals have ballooned. This dynamic raises concerns of labor exploitation amid commercial success (Oto, 2025).

International distributors also derive great benefit. Companies like Crunchyroll (U.S./Japan), Funimation (U.S., now merged with Crunchyroll under Sony), Netflix, and global toy/game manufacturers (for franchise tie-ins) all capitalize on the worldwide appetite for Japanese content (Parrot Analytics, 2024). For instance, when an anime blows up globally (e.g., *Demon Slayer* setting box-office records), licensees selling everything from English-edition manga to figurines to video game adaptations profit alongside the original Japanese studio. The Japanese “media mix” model—which integrates manga, anime, games, music, and merchandise into one cross-promotional machine—has essentially been exported, with international partners often handling distribution in their regions. Thus, the economic beneficiaries are both Japanese and multinational. Japanese companies still create the IP and often dominate domestic revenues, but globalization means overseas companies earn a cut of the franchise’s global monetization. In many cases, it is collaborative: for example, a U.S. toy company might hold the global toy rights for a Japanese anime property, enriching both the Japanese IP owner and the American licensee (Weng, 2025).

One illustrative data point: by 2023, overseas markets’ importance had grown such that the Japanese anime industry would have been ~YEN 1.1 trillion smaller without foreign sales. Recognizing this, Japanese studios and publishers increasingly tailor content for global appeal and work closely with foreign platforms (Handjaja, 2024). In sum, global success brings global profit-sharing. Japanese creators and studios gain new revenue streams, but powerful distributors and retailers abroad also take their share, sometimes even steering projects (e.g., Netflix commissioning original anime productions). The economic pie is growing, but it’s divided among many players—with the actual artists often receiving the smallest slice (Oto, 2025).

3.3 Societal Impact

The proliferation of manga, anime, and gaming in daily life has sparked debates about their societal and psychological impacts, both positive and negative. On one hand, these hobbies contribute to economic growth, career opportunities, and creative communities; on the other, concerns have been raised about addiction, social isolation, and labor exploitation. Are negative effects being downplayed in favor of economic gains? How is Japan addressing internal issues spawned by its pop culture industries? And what are the cultural/psychological effects on youth deeply immersed in these “virtual narratives”?

3.3.1 Addiction and Social Withdrawal (“Otaku” Culture)

Hirasawa, Kato, and Sakuma (2024) discuss the influence of idealized fictional characters and the popularity of cosplay. Sakuma observes that youth, especially in France, aspire to become like stylized anime characters, with real effects on perceptions of beauty and identity. Dr.

Kato adds that young people distinguish between the virtual world and reality, often using technology (like photo editing in cosplay) to navigate between personal and digital identities. This suggests both positive (creative self-expression) and cautionary (identity confusion, social comparison) impacts for youth heavily invested in these virtual narratives. Intense fandom or usage of any media can tip into problematic behavior. In Japan, the term *otaku* describes dedicated (sometimes obsessive) pop culture fans, and extreme cases of social withdrawal related to such obsessions are labeled *hikikomori*. As Japanese anime and games spread globally, similar phenomena—binge-watching, gaming addiction, cosplay obsession—have been observed worldwide. Research is beginning to treat anime viewing as a potential behavioral addiction akin to gaming or internet addiction. A 2024 clinical study of 86 adolescents found that 36.8% of them met criteria for “problematic anime-watching,” exhibiting signs of addiction (such as loss of control over viewing) (Yamak & Işık, 2024). Those in the “problematic” group had significantly higher social anxiety and used avoidant coping strategies more, suggesting that excessive anime consumption might both result from and contribute to mental health and social difficulties (Yamak & Işık, 2024).

The authors concluded that “problematic watching of anime may be a variant of behavioral addiction” and cautioned that it warrants further study (Yamak & Işık, 2024).

Similarly, a large 2024 German survey examined adults’ interest in anime/manga and mental health. It found a nuanced picture: on average, higher interest in anime was associated with some adverse outcomes—such as more depressive and anxiety symptoms and a greater feeling of social disconnectedness—but also with positive outcomes like higher self-reported happiness and laughter frequency (Hajek & König, 2024). In other words, avid fans might experience both negatives (e.g., staying home watching anime instead of socializing, hence loneliness or anxiety) and positives (enjoyment, sense of belonging to a fan community) simultaneously. The authors emphasized the need for nuance, noting that “a higher interest in manga and anime was associated both with negative and positive outcomes,” especially that anime fans reported greater subjective well-being even if some mental health indicators were poorer (Hajek & König, 2024). This complexity suggests it’s overly simplistic to say “anime is harmful” or “anime is purely beneficial”—it can be a double-edged sword depending on the individual’s life context.

In Japan, the extreme of social withdrawal is the *hikikomori* phenomenon—typically youth (or even middle-aged individuals) who seclude themselves at home for months or years, often disengaged from work or school. Not all *hikikomori* are pop culture addicts (varied factors include academic pressure, job market issues, mental health conditions), but a subset retreat into virtual hobbies like games, manga, or internet communities as their main interaction. Government surveys in 2019 estimated about 1.15 million *hikikomori* aged 15–64 in Japan (Nippon.com, 2023), roughly 2% of that age group, and experts suggest the true number (including unreported cases or older recluses) might be higher. There is concern that a steady diet of virtual experiences can become both an escape from and a reinforcement of real-world social avoidance, creating a vicious cycle. At the same time, it should be noted that pop culture did not cause *hikikomori*—it’s a complex social issue. In fact, psychiatrist Tamaki Saitō (who coined the term) emphasizes that *hikikomori* is more a symptom of economic and social pressures in modern Japan, not an illness caused by anime or games (Weng, 2025). Pop culture may simply be the refuge that some withdrawn individuals choose.

Are such negative effects downplayed? For many years, Japan’s public discourse around Cool Japan and content exports focused on the rosy economic and soft-power aspects, with far less official acknowledgment of otaku-related problems. The government and industry have been keen to promote anime and gaming as creative industries, so issues like game addiction or socially reclusive fans were often left to psychologists or social critics to discuss, not highlighted by promoters. This is somewhat changing: for example, Japan in 2019 passed a controversial law limiting minors’ gaming time in Kagawa Prefecture (an attempt to curb gaming addiction), indicating that authorities recognize a need to address digital addiction. Still, such measures are rare and contentious. The economic benefits of pop culture—thousands of jobs, billions in revenue, global prestige—have tended to overshadow the more intangible social downsides in policy conversations. One could argue there has been a “selective blindness” at the policy level: enthusiastically embracing otaku culture’s money-making power while sidestepping uncomfortable questions about, say, extreme fan isolation or the normalization of certain unhealthy behaviors (Weng, 2025).

3.3.2 Labor Exploitation in Production

Another serious societal issue is the treatment of workers behind the scenes in these industries. Anime in particular has faced criticism for exploitative labor conditions. The global boom is built on the toil of animators, illustrators, coders, and other creatives who often endure low pay, long hours, and precarious employment. In 2023–24, this issue drew international attention when a United Nations report condemned Japan’s anime and gaming industries for labor exploitation, citing “excessive hours, low pay and disregard for intellectual property rights,” along with widespread unpaid overtime and lack of job security for creative freelancers (Oto, 2025). This UN scrutiny—remarkable for a cultural sector—put pressure on Japan to respond.

Japan has begun addressing these labor issues, at least on paper. In late 2024, a new Freelance Protection Act came into effect, Japan’s first law to specifically offer some protections to freelance and contract workers (who comprise the bulk of animators and artists) (Oto, 2025). It mandates written contracts, bans unpaid extra work, and requires timely payment (within 60 days) for freelancers (Oto, 2025). This law directly targets common abuses in anime production, such as last-minute unpaid revisions and delayed payments. Additionally, awareness of the problem has grown: both domestic and international media have published exposes on “poverty wages” in anime, and worker advocacy groups (like the Japanese Animation Creators Association, JANICA) have conducted surveys to quantify the hardship (e.g., finding average animator incomes under YEN 2 million) (Oto, 2025). Some studios have responded by raising salaries modestly or moving to digital workflows to ease burdens, and there are movements to unionize or create support networks (e.g., the Animator Dormitory project which provides affordable housing to struggling artists).

Despite these steps, enforcement remains weak and systemic change slow. The industry’s production pipeline—with tight deadlines, outsourced in-between animation, and a constant scramble to make seasonal release slots—still incentivizes overwork. Major studios like MAPPA and Madhouse have faced public accusations of pushing staff to 100-hour weeks and literal sleep deprivation at the office. Many tasks get outsourced to lower-wage countries (South Korea, China, Vietnam, etc.), which alleviates some labor cost pressure in Japan but depresses wages overall and leads to quality control issues. As one commentary put it, studios are “locked in a competitive cycle of tight deadlines and razor-thin margins” and thus “have

little leverage to demand better pay” for workers (Oto, 2025). The ethical paradox is stark: “anime’s global boom runs on poverty wages,” as one headline noted, meaning the world’s enjoyment of these beautiful works is subsidized by the creators’ sacrifice (Oto, 2025). The UN report and new law are signs that Japan can no longer completely ignore this dark side. But meaningful change likely requires industry-wide reform—fewer shows produced, higher budgets per show, and consumers willing to tolerate higher prices—none of which happen overnight. For now, many animators and game developers remain “trapped in the shadows of [anime’s] success,” watching their creations become global hits while they struggle to pay the bills.

It’s worth noting that industry experts and promoters rarely highlight these labor issues when celebrating pop culture’s economic triumphs. Here again, the negative is downplayed: at glitzy “Cool Japan” conferences about content strategy, one seldom hears about animator burnout or artists living in poverty. It has often fallen to journalists, independent analysts, or international bodies to raise these critiques. This dynamic—of the economic narrative eclipsing the human narrative—underscores the importance of balanced analysis. Japan’s pop culture revolution has societal costs that must be acknowledged alongside its benefits (Weng, 2025).

3.3.3 Cultural and Psychological Impacts on Youth

For the generation coming of age with ubiquitous anime, manga, and games, these media are more than entertainment; they are cultural touchstones shaping identity. Engaging deeply with fictional narratives can have psychological effects. Many young people derive inspiration, moral lessons, and a sense of community from pop culture. Anime and manga often explore complex themes (identity, ethics, trauma, hope) that resonate with youth and can provide coping mechanisms or spark creativity. The rise of fan communities—at conventions, online forums, cosplay events—has given many youths a social outlet and a sense of belonging that they might not have had elsewhere. In this way, pop culture can be profoundly positive, especially for those who feel like outsiders; it offers a tribe of fellow fans and a shared passion.

On the flip side, there are concerns that over-immersion in virtual worlds might affect some youths’ development or worldview. One fear is that heavy engagement in fictional narratives could lead to blurred lines between fantasy and reality, or an avoidance of real-life challenges. For instance, a teenager who spends all their free time in a gaming world or bingeing anime might neglect building real-world social skills or pursuing physical activities. There is also the issue of content: some criticize that certain manga/anime portray violence or sexualization in ways that could desensitize young viewers or reinforce stereotypes (e.g., idealized gender roles). However, research on these aspects is not definitive and often finds that context matters—e.g., teens who have healthy social support are unlikely to be negatively influenced by media, whereas those already at risk might gravitate to escapism (Weng, 2025).

Academic studies provide insight into psychological correlations. A 2022 study using structural equation modeling examined identification with anime/idol subculture among Japanese youth and found that strong identity in these subcultures was positively associated with anxiety, depressive symptoms, aggression, and even suicidal tendencies (Liu et al., 2022). It suggested that societal stigma and low “reputation” of otaku interests mediated these adverse outcomes (Liu et al., 2022). In plainer terms, a young person who is deeply into anime/idol culture might experience mental distress partly because they feel their hobby is disrespected or

makes them an outsider in society. The study importantly noted that other subcultures (like sports fans or fashion enthusiasts) didn't show such associations, implying a unique pattern for those in geek/otaku circles (Liu et al., 2022). One interpretation is that social marginalization of otaku youth—being labeled weird or lonely—can harm their mental health, rather than the anime content itself directly causing depression. This points to a need to foster acceptance of diverse hobbies to mitigate negative psychological impacts.

In terms of cultural impacts, Japanese pop culture's globalization means that youth from Boston to Buenos Aires may share a familiarity with Naruto's ninja way or Mario's Mushroom Kingdom. This can be culturally enriching, increasing cross-cultural awareness and curiosity about Japan. Indeed, many foreign fans have been motivated to learn Japanese words, try Japanese cuisine, or even study abroad in Japan because of their media exposure. Such outcomes promote intercultural understanding in a way previous generations didn't experience (Fennell et al., 2013). At the same time, there's a risk of creating or reinforcing stereotypes: for example, some overseas fans might develop an overly "anime-ized" image of Japan—thinking of it as a land of eccentric characters, schoolgirl uniforms, and quirky customs as seen in shows. They may be surprised that everyday Japan is far more ordinary and not every Japanese person is a samurai or magical girl! But those stereotypes are arguably more benign (*kawaii* = cute, or cool tech culture) compared to past negative stereotypes of Japan (militaristic, xenophobic). As one Quartz article observed, Japan's global image has shifted from fearsome to cute/weird over decades, largely due to cultural exports like Hello Kitty and Pokémon replacing the old images of soldiers and factories (Bain, 2020).

Government's JET program (which brings foreign youth to teach English in Japan) reported many applicants mentioning anime/manga as their initial motivator for learning about Japan. In tourism, pop culture has been a definite draw—local governments in Japan have mapped "anime pilgrimage" sites and run promotional campaigns knowing foreign fans will visit locations from their favorite shows (Handjaja, 2024). All of this suggests a net positive effect on cultural understanding: Japanese pop culture has acted as an ambassador, making aspects of Japan's heritage and society accessible and attractive to global audiences.

However, there is a flipside: the risk of reinforcing or creating stereotypes about Japan. When one particular facet of culture becomes dominant globally (in Japan's case, often the quirky, cute, or fantastical images of anime), people's overall image of that country can become skewed. For instance, Western fans might adore the hyper-depicted vision of Japanese high school life in manga (with ever-dramatic festivals, elaborate bento lunches, etc.) and assume that's an accurate portrayal of all Japanese youth—potentially overlooking the diversity and complexity of real Japanese society. Stereotypes like "all Japanese are polite and shy" or "Japan is a land of bizarre fashion and technology" often stem from superficial engagements with media portrayals (Jay Japan, 2023). While these are generally positive or neutral stereotypes (unlike war-era racist caricatures), they can still be reductive. Some commentators point out that the global *Kawaii*/cool image of Japan—while better than the past—masks issues (e.g., one might think Japan is just anime and vending machines and forget about its very real economic and demographic challenges). There's even a view that the government prefers the pop culture image to overshadow uncomfortable topics; as cynics state "Japan used anime, manga... to cover its past" in the eyes of the world. That said, the fact that Japanese media diversity is now on display internationally helps counter one-dimensional views. Not all

anime are about ninjas and robots—there are anime about farming, jazz music, female office workers, single fathers, etc. As international audiences consume a wider range of content, they gain a more textured understanding of Japanese life and imagination.

Additionally, the very presence of subtitled/dubbed Japanese voices on screen or Japanese text in games accustoms global consumers to a foreign aesthetic and language. This familiarity can breed curiosity rather than contempt—arguably a win for cultural diplomacy. Even when stereotypes form, they are usually affectionate stereotypes (e.g., believing Japan is extremely clean and efficient because anime cityscapes are often orderly, or that Japanese people are all honorable like anime heroes), which arguably improve Japan’s brand (Bain, 2020).

3.4 The “Japanese Model”—Is It Exportable?

Japan’s pop culture industries operate with certain business models that have led to their unique blend of commerce and creativity. These include the production committee system for financing anime, the relentless output of weekly serialized manga (often in phonebook-sized magazines), and the integration of content and merchandise (every hit series spawns toys, games, etc.). Can these models be exported or emulated by Western media industries?

Sakuma; Hirasawa; Kato(2024) shares that Japanese pop culture is increasingly "picked up" and remixed abroad, leading to local adaptations and hybrid creations (e.g., the "Manga/Anime look" being incorporated into national events or retold with local stories).

In some respects, Western entertainment has already embraced similar approaches. Hollywood’s franchise strategy today—think of the Marvel Cinematic Universe or Star Wars—mirrors Japan’s media mix concept, where a storyworld is extended across films, TV, comics, games, and merchandise in a coordinated way (Weng, 2025). Western media companies have observed how Japanese hits generate ecosystems of products and are keen to do the same. The notion of cultivating a devoted fandom that will consume not just a film but also the spin-off novel, T-shirt, video game, and convention experience is now standard in the West (often dubbed the “transmedia” approach) (Weng, 2025). In that sense, the commercial creativity model is exportable—indeed, it’s become a global norm for franchise IP.

However, there are elements of Japan’s industry that are less easily replicated elsewhere. The production committee system, which spreads investment (and risk) across multiple companies (publisher, TV network, toy company, etc.) for an anime project, is somewhat unique (Weng, 2025). It evolved in Japan’s specific market context and can be opaque and cumbersome. Western producers have tended to favor simpler financing models or individual studio control. Likewise, the sheer volume of output in Japan—e.g., 100+ new anime series each year, weekly chapters from manga artists, frequent game sequels—relies on labor-intensive practices and, frankly, an exploitative labor model (long hours, few labor protections) that Western industries (with stronger unions and labor laws) might find difficult to adopt or justify (Oto, 2025). In fact, as labor issues gain attention, even Japan may need to reform these practices rather than other countries copying them.

Additionally, the cultural flavor of Japanese content is a big part of its appeal, and that can’t simply be transplanted. Western studios can imitate the anime art style or hire Japanese creators, but fans often detect an “authenticity” in products that originate from Japan’s creative culture. For example, when Western studios attempt live-action remakes of anime (*Ghost in*

the Shell, Cowboy Bebop), the reception has been lukewarm—suggesting that simply borrowing the IP or style doesn’t guarantee the same magic. What is exportable is the idea of leveraging subcultures and niche genres for mainstream success. Japanese pop culture proved that even non-Western, non-Hollywood content can captivate globally if it’s distinctive and high quality. This lesson has not been lost on other countries’ media industries (South Korea’s rise in K-pop and K-drama is a parallel case of leveraging local culture globally, sometimes learning from Japan’s playbook) (Weng, 2025).

In conclusion, commercialization has undoubtedly influenced Japanese pop culture’s creative process, introducing more formula and profit-driven decisions. The economic benefits of global success are distributed across a complex international supply chain, where unfortunately the original artists often see minimal financial reward (Oto, 2025). The Japanese model of mixing commerce with creativity has been highly successful and partly emulated worldwide, though certain industry structures remain unique. The challenge moving forward is to sustain creativity and fair rewards amid booming business—ensuring that the pursuit of profit does not stifle the very cultural authenticity that made Japanese media a global force in the first place.

3.4.1 Local Adaptation and Glocalization

When Japanese pop culture lands in a new locale, it doesn’t exist in a vacuum; local cultures interact with and reinterpret it, a process often termed glocalization. There are numerous examples of this dynamic:

- **Fan Subcultures:** Early on, overseas fans who couldn’t legally access anime engaged in fan-subbing (fans translating and subtitling anime in their language) and distribution. This not only spread anime but also infused local flavor—fan-subbers sometimes added cultural notes or slang to bridge understanding (Ohsawa, 2015). In doing so, they created hybrid products: Japanese content with local linguistic/cultural mediation.
- **Dubbing and Localization:** Professional localization of anime and games also adapts content for local audiences. English dubs in the 1990s famously “Americanized” certain details (turning onigiri rice balls into donuts in Pokémon, for example) to resonate with U.S. kids. While purists disliked such changes, it demonstrated how localizers reinterpret content to fit cultural context. Modern dubbing tends to be more faithful, but still, jokes or idioms are often rewritten in a local vernacular so that the humor lands. Similarly, manga might be flipped to read left-to-right in some markets historically, or translated with local colloquialisms.
- **Cosplay and Conventions:** Around the world, anime fans have embraced cosplay (costume play), sometimes blending it with local culture. For instance, at conventions you might see a samurai Batman—a mashup of Japanese and Western icons—or local cultural twists like Indian anime fans cosplaying a character but incorporating traditional textiles. Communities in each country celebrate Japanese pop culture in their own style (e.g., France’s Japan Expo mixes French comic artists with Japanese guests, creating a cross-cultural creative space).
- **Local Creators Influenced by Japan:** Perhaps the most significant adaptation is in the creative output of other countries. Inspired by manga and anime, many local artists have developed their own comics and animations in a similar style—effectively glocalizing the art form. In South Korea, the manhwa (comic) and webtoon industry, while distinct, has been influenced by Japanese manga storytelling techniques.

In the West, shows like *Avtar: The Last Airbender* or *Castlevania* are Western productions clearly inspired by anime aesthetics and narrative style, often called “anime-influenced animation”.

Importantly, this adaptation process means Japanese pop culture doesn’t just homogenize global culture under a Japanese banner; rather, it becomes part of a new cultural blend. Fans in each country bring their own interpretations—sometimes even misinterpretations that become new memes or trends. For example, the West’s embrace of the term “waifu” (a Japanese loanword for a fictional crush) took on a life of its own in global fan communities, not exactly how a Japanese fan would use the term. Such phenomena illustrate how global consumers actively participate in defining pop culture meanings, not just passively consuming an exported product (Weng, 2025).

3.4.2 Impact on Other (Non-Western) Cultural Voices

A concern in globalization is whether the dominance of a few cultures’ media (historically Hollywood, and now add Tokyo and Seoul) crowds out the voices of smaller or less influential cultures. Japanese pop culture’s global rise, especially across Asia, did initially raise alarms about “cultural imperialism”—the fear that local traditions might be eroded by the flood of manga and anime. In the early 2000s, some Asian governments imposed quotas or bans: for instance, South Korea restricted Japanese cultural imports until the late 1990s due to post-colonial sensitivities. China in the 2000s instituted quotas and periodic crackdowns on Japanese animation on television to protect its domestic animation industry and limit foreign influence on youth. These protective measures indicate that Japan’s cultural influence was perceived as a threat to local content creators. Japanese anime was so popular in some regions that local cartoons struggled to compete for young viewers’ attention (Ohsawa, 2015).

However, one could argue that Japanese pop culture helped pave the way for other non-Western cultures to also gain global audiences. It proved that stories grounded in Asian settings and sensibilities could be universally appealing. This may have emboldened other industries—notably South Korea’s, which in the 2010s launched its own “Korean Wave” of K-pop and K-dramas that now share the global stage. Rather than one completely overshadowing the other, we see a more multipolar cultural scene: Japanese anime, Korean dramas, Chinese online novels, etc., each finding international followings. In Southeast Asia, there’s burgeoning content creation (e.g., animation studios in Malaysia and the Philippines producing shows for Netflix) that often draw from both Japanese inspiration and indigenous stories. Japanese pop culture hasn’t necessarily silenced these voices; in some cases, it provided the training wheels—local artists grew up watching anime and then started creating their own work, sometimes supported by Japanese companies outsourcing work to them. For instance, many “anime” are co-produced across Asia (a single episode might be key-animated in Japan but in-betweened and colored in Vietnam or Philippines). So the final product, while branded as Japanese, actually involves a transnational collaboration of Asian talent.

That said, inequities remain. Smaller countries’ cultural output still rarely reaches the global penetration of Japanese media, and it can be difficult for local content to flourish when the market is saturated with slick Japanese (or American) productions. There is a valid worry that a teenager might prefer watching the latest *Attack on Titan* episode over a locally-made animation, making it hard for local studios to get investment or recognition. It’s similar to how

Hollywood dominance affected other national cinemas—now Japanese and Korean wave content join Hollywood in competing with local arts. The hope is that rather than a zero-sum game, global audiences will simply enjoy more variety. The rise of streaming platforms has actually increased access to diverse content; niche shows from various countries can find viewers. Japanese media is a large part of this mix, but not the sole player. In fact, as Japan's society ages and its production capacity eventually plateaus, other countries (like China with its huge animation investments or Korea with webtoons turning into Netflix hits) might start to rival Japan in the “cool culture” space.

In conclusion, the globalization of Japanese pop culture has been largely positive for cross-cultural engagement, giving many people a gateway to learn about or even personally experience Japan. It has created a shared pop lingua franca among youth worldwide (references to “Super Saiyan” or “Pokémon” need no translation). Local cultures have shown agency in adapting and reinterpreting Japanese media, blending it with their own contexts and even creating original works inspired by it. While there is the risk of cultural homogenization—where everyone watches the same few mega-franchises at the expense of local folk culture—the reality seems more complex. Japanese pop culture didn't so much erase local cultures as it added a new layer to global culture, one that is being continually remixed by fans and creators everywhere (Weng, 2025). In the future, we may see an even more diverse landscape where Japanese content stands alongside other non-Western content in a rich tapestry, each influencing the other (indeed, contemporary anime are now influenced by Korean webtoon styles and Chinese market preferences, showing a two-way exchange). The key is ensuring that the global dominance of one voice doesn't mute others, and thus far, Japanese pop culture's rise has encouraged a broader acceptance of non-Western media rather than a monoculture.

4. Conclusion and Future Outlook

The global impact of Japanese pop culture since 2000 has been profound, multifaceted, and at times paradoxical. Anime, manga, and games have become not only major economic exports but also powerful vehicles for cultural diplomacy, identity formation, and creative innovation. Their influence is visible in everything from language learning and tourism to the aesthetics of global media and the formation of transnational fan communities (Fennell et al., 2013; Weng, 2025).

Yet, this success story is not without its shadows. The industry's rapid expansion has exposed and, in some cases, exacerbated issues such as labor exploitation, creative burnout, and the marginalization of original creators in favor of corporate interests (Oto, 2025; Weng, 2025). The psychological and social effects of deep engagement with virtual narratives remain complex, with research showing both positive and negative outcomes for fans and creators alike (Yamak & Işık, 2024; Hajek & König, 2024; Liu et al., 2022).

Looking ahead, several trends and challenges are likely to shape the next phase of Japanese pop culture's global journey:

- **Diversification and Collaboration:** As global audiences become more sophisticated, there is growing demand for diverse stories, characters, and creative voices. Japanese studios are increasingly collaborating with international partners, and creators from other countries are contributing to the evolution of anime, manga, and games). This cross-pollination may lead to new hybrid genres and innovative storytelling techniques.

- **Digital Transformation:** The rise of streaming platforms, social media, and digital distribution has democratized access to Japanese pop culture, allowing niche works to find global audiences and enabling fans to participate more actively in content creation and promotion. At the same time, these changes put pressure on traditional business models and raise questions about sustainability and fair compensation for creators.
- **Cultural Diplomacy and Soft Power:** Japanese pop culture will likely remain a key tool of soft power, shaping perceptions of Japan around the world (Nye, 2004; Lam, 2007). However, the government and industry must balance the desire for global appeal with the need to preserve the unique qualities that make Japanese media distinctive.
- **Ethical and Social Responsibility:** As awareness of labor issues, mental health, and representation grows, there is increasing pressure on the industry to adopt more ethical practices and to address the needs of both creators and consumers (Oto, 2025; Weng, 2025). This includes improving working conditions, supporting diverse voices, and fostering healthy fan communities.

In conclusion, Japanese pop culture's global impact is a testament to the power of creativity, storytelling, and cultural exchange. Its future will depend on the industry's ability to adapt to changing technologies, audience expectations, and ethical imperatives—while continuing to inspire, challenge, and connect people across borders. The story of Japanese pop culture is still being written, and its next chapters will likely be shaped by a more interconnected, diverse, and conscious global community.

Bibliography

- Bain, M. (2020, May 21). *How Japan's global image morphed from military empire to eccentric pop-culture superpower*. Quartz. <https://qz.com/1806376/japans-image-has-changed-from-fierce-to-lovable-over-the-decades>
- Fennell, D., Liberato, A. S., Hayden, B., & Fujino, Y. (2013). *Consuming anime: Japanese media consumption and multicultural worldview*. *Television & New Media*, 14(5), 440–456. <https://doi.org/10.1177/1527476412454680>
- Hajek, A., & König, H. H. (2024). *Interest in anime and manga: Relationship with (mental) health, social disconnectedness, social joy, and subjective well-being*. *Journal of Public Health*, 32(?), Article 23. <https://link.springer.com/article/10.1007/s10389-024-02341-9>
- Handjaja, R. (2024, Nov 13). *Anime industry revenues abroad overtake home market*. *Animenomics (Substack brief)*. <https://news.animenomics.com/p/anime-market-outside-japan-up-18-percent-in-2023>
- Hirasawa, N., Kato, J., & Sakuma, M. (2024, August 23). *Impact & synergy of manga, anime, and video games: Japanese soft power's impact on global markets – Positive? Negative? Balanced?* [Webinar]. Mizuho India Japan Study Centre, Indian Institute of Management Bangalore. <https://www.youtube.com/watch?v=xKDia05R2uc>
- Iwabuchi, K. (2002). *Recentering globalization: Popular culture and Japanese transnationalism*. Duke University Press.
- Jay Japan. (2023). *Debunking 10 Japanese Culture Stereotypes in Anime: The Real Story*. <https://www.jay-japan.com/blogs/otaku-spot/debunking-10-japanese-culture-stereotypes-in-anime-the-real-story>
- Kelts, R. (2008). *JapanAmerica*. New York, NY: St Martin's Press.
- Leheny, D. (2015, Jan 20). *Naruto's Limits: What Soft Power Can Actually Achieve*. *Nippon.com*. <https://www.nippon.com/en/in-depth/a03902/>
- Liu, Y., Wen, J., et al. (2022). *Does anime, idol culture bring depression? Structural analysis on subcultural identity and psychological outcomes*. *Heliyon*, 8(11), e11345. <https://pmc.ncbi.nlm.nih.gov/articles/PMC9489955/>
- Maylyn Weng. (2025). *From Doraemon to Diplomacy: The role of manga and anime in Japanese soft power*. *Synergy*, Vol. 4 (East Asia section).
- Nippon.com. (2023). *Japan's "Hikikomori" Population Could Top 10 Million*. <https://www.nippon.com/en/japan-topics/c05008/japan%E2%80%99s-hikikomori-population-could-top-10-million.html>
- Ohsawa, Y. (2015). *A contemporary version of globalization: New ways of circulating and consuming Japanese anime and manga in East Asia*. *Journal of Asia Pacific Studies*, 4(2), 19–42. <https://www.jiu.ac.jp/files/user/education/books/pdf/840-42.pdf>
- Oppliger, J. (2015). *Ask John: Has Commercialism Reduced the Artistic Integrity of Anime?* *AnimeNation Anime News Blog*. <https://www.animenation.net/blog/ask-john-has-commercialism-reduced-the-artistic-integrity-of-anime/>
- Oto, W. (2025, Mar 18). *Anime's global boom runs on poverty wages*. *Tokyo Weekender*. <https://www.tokyoweekender.com/japan-life/news-and-opinion/animes-global-boom-runs-on-poverty-wages/>
- Pace-McCarrick, S. (2021, Dec 11). *How far does anime challenge Joseph Nye's "soft power" framework?* *E-International Relations*. <https://www.e-ir.info/2021/12/11/how-far>

-does-anime-challenge-joseph-nyes-soft-power-and-its-approach-to-culture/

Parrot Analytics. (2024). *Japanese Anime Captured \$19.8 Billion in 2023 Global Revenue, Cementing Japan's Role as a Global Entertainment Leader*.

Yamak, Y. H., & Işık, Y. (2024). *Anime watching: Is it a new kind of addiction? Middle East Current Psychiatry*, 31(73). <https://mecp.springeropen.com/articles/10.1186/s43045-024-00463-0>

Inclusive and Sustainable Growth: Institutional and Technological Innovations in India and Japan

Abstract:

Sustainable and inclusive growth seeks to align economic progress with social equity and environmental stewardship, emphasizing “sustainable equity” where benefits and burdens are fairly shared across generations. This paper examines whether such growth is a reality or a mirage, with a focus on India and Japan. Drawing on insights from two MIJSC webinars, it analyzes institutional frameworks, technological innovations, and policy measures aimed at balancing inclusivity with sustainability.



PRABHA NARAYANA

Research Associate,
Mizuho India Japan Study Centre
Indian Institute of Management
Bangalore

The findings highlight India’s grassroots innovations and Japan’s universal systems, while underscoring systemic challenges. The study concludes that achieving sustainable equity is possible but requires coordinated policies, cross-sector collaboration, and state-led interventions.

Index of Contents

1. Introduction
2. Interdependence of Sustainability and Inclusivity
 - 2.1. SDGs: Targeting Sustainable Equity
 - 2.2. Evaluating Inclusivity in the Path to Sustainable Growth
3. Sustainable Equity
 - 3.1. Foundations of Social Equity
 - 3.2. Sustainable Equity: Challenges and Solutions
4. Challenges to Achieve Sustainable and Inclusive Growth
 - 4.1. Overcoming Sustainability Barriers: Comparative Perspectives from India and Japan
 - 4.2. Targeted Solutions for Sustainability Challenges in India and Japan
 - 4.3. Addressing Inclusivity Challenges in India and Japan: Contextual Solutions for Equitable Development
 - 4.4. Comparative Insights
5. Key Dimensions Driving Sustainability and Inclusive Growth
6. Conclusion

1. Introduction

Sustainable and inclusive growth is a holistic approach to development that seeks to balance economic advancement with social equity and environmental responsibility. It goes beyond mere increases in GDP or industrial output by focusing on who benefits from growth and how growth is achieved. On the inclusive side, this approach ensures that all individuals—regardless of income level, gender, region, caste, ethnicity, or ability—have equal access to opportunities, resources, and services such as education, healthcare, employment, and technology. It aims to reduce poverty, bridge inequality gaps, and empower marginalized groups to participate fully in economic and social life. On the sustainability side, it stresses the importance of using natural resources wisely to avoid environmental degradation and to preserve ecosystems for future generations. Sustainable growth supports the use of clean energy, responsible production and consumption patterns, and environmental protection measures that mitigate climate change and promote long-term resilience.

Together, sustainable and inclusive growth envisions a world where economic progress does not come at the cost of the environment or at the exclusion of any section of society. In simple terms, it is about creating a world that is both fair and sustainable. This will bring out the need to create a society that follows the concept of “Sustainable Equity”. Sustainable equity means organizing growth, technology, and public services so that benefits and burdens are shared—now and across generations—within environmental limits. Recent work in sustainability science argues that equity must be built into how we design and model policies (e.g., who gains jobs, who bears pollution), not tacked on later (Amanda Giang, 2024). As countries decarbonize and digitize, transitions can either reduce or widen inequality. Embedding equity early improves social buy-in and speeds implementation (Luis Fernández Intriago, 2025). It aligns closely with the goals of the United Nations Sustainable Development Agenda (SDGs), which emphasize prosperity, people, and the planet in an interconnected way. In the world, which is facing various issues and becoming unstable due mainly to the rapid increase of population and economic growth particularly in emerging nations, international co-operation aimed at creating a sustainable society is being promoted, such as the adoption of the 2030 Agenda for Sustainable Development at the United Nations Sustainable Development Summit in September 2015.

This paper examines the pressing question of whether sustainability and inclusive growth are a reality or a mirage. It explores the factors that promote or hinder sustainability and inclusivity in achieving sustainable equity, while highlighting the role of government institutions and policies in the contexts of India and Japan. Drawing on expert insights from a series of webinars organized by the MIJSC to spotlight sustainability and inclusivity, it synthesizes key perspectives from two landmark discussions. The January 2023 webinar, “Is Sustainable Growth a Mirage? Indian and Japanese Approaches to Building Growth Ecosystems”, featured Prof. Hari Srinivasan and Ms. Deeksha Vats. The discussion underscored the importance of integrating inclusivity into sustainability efforts, detailing the measures undertaken in both India and Japan to achieve this balance. The December 2023 webinar, “Is Inclusive Growth a Mirage? Institutional and Technological Innovations in India and Japan”, brought together Prof. Kathryn Iбата-Arens and Dr. Mamidipudi Ramakrishna Sharan. This session explored how institutional frameworks, and technological innovations can foster equitable development. It contrasted Japan’s success with universal systems against India’s grassroots innovations, while also addressing systemic challenges that hinder scalability and

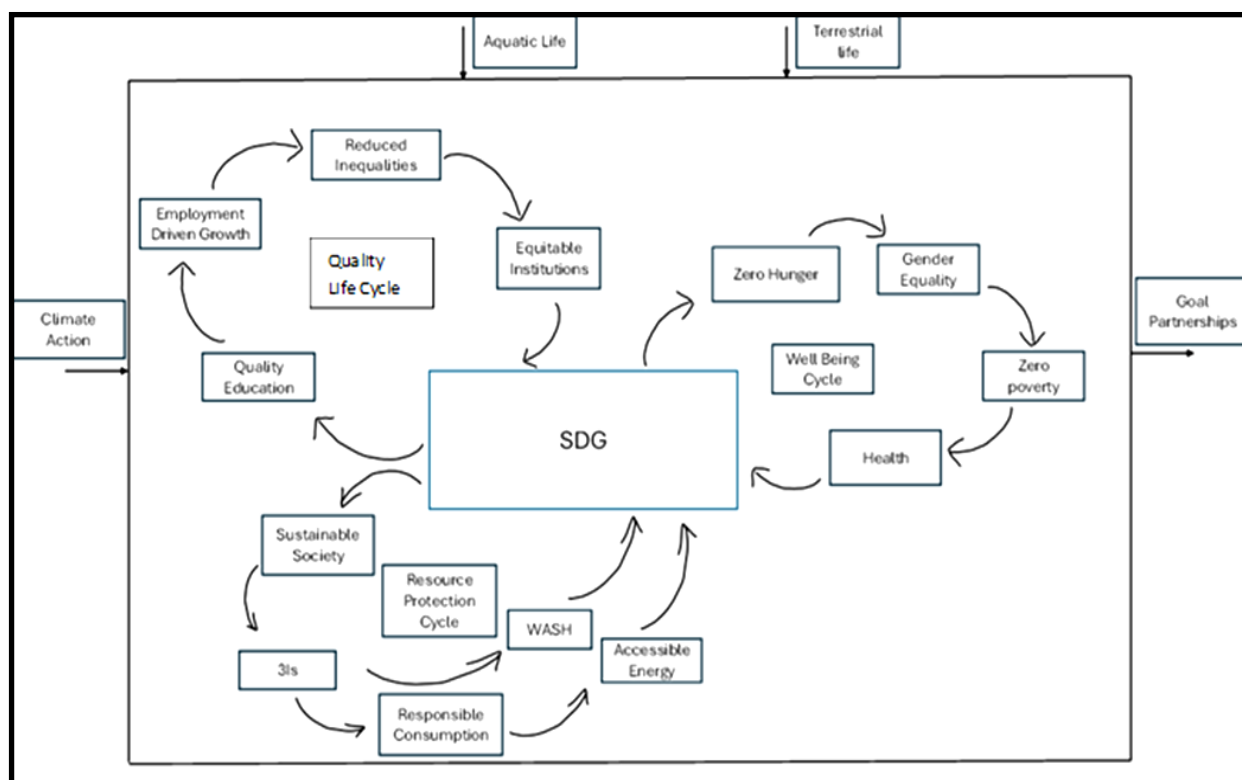
long-term sustainability. The analysis concludes that inclusive and sustainable growth is indeed achievable. However, it demands deliberate policy action, interdisciplinary collaboration, and targeted state-led interventions to address market failures and institutional gaps.

2. Interdependence of Sustainability and Inclusivity

According to the Brundtland Report (Our Common Future) by the World Commission on Environment and Development (1987), sustainable development is not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs. (Development, 1987) The Brundtland Report and the UN's Sustainable Development Goals (SDGs) (2015) are foundational texts that extensively discuss the interdependence of economic, social, and environmental aspects of sustainability, often highlighting inclusivity as a crucial component.

2.1 SDGs: Targeting Sustainable Equity

The Sustainable Development Goals (SDGs), adopted by the United Nations in 2015, represent a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity by 2030. (UN, 2025) These 17 interlinked goals form the core of the 2030 Agenda for Sustainable Development, providing a shared blueprint for all countries to follow. Each SDG addresses a specific global challenge—ranging from environmental degradation to social inequality—and outlines targets and indicators to measure progress. Together, they aim to create a more inclusive, equitable, and sustainable world.



The SDGs are integrated and indivisible, meaning progress in one goal often supports advancement in others. For example, promoting quality education (Goal 4) improves employment prospects (Goal 8), helps reduce inequalities (Goal 10), and fosters responsible citizenship (Goal 16). Achieving the SDGs requires collective action—from governments, businesses, academia, civil society, and individuals. The success of this ambitious agenda depends on aligning policies, investments, and behaviors with these global objectives.

The Sustainable Development Goals Report 2025 reveals real and substantial development gains during the past decade. Since 2015, the world has made notable strides in expanding access to education, improving maternal and child health, and bridging the digital divide. Yet progress has been fragile and unequal. Millions still face extreme poverty, hunger, inadequate housing, and a lack of basic services. Women, people with disabilities, and marginalized communities continue to face systemic disadvantages. Escalating conflicts, climate chaos, rising inequalities, and soaring debt servicing costs are holding back further advancements (UN, 2025). This situation makes it imperative to adopt measures that foster inclusive growth by engaging all stakeholders, thereby ensuring the achievement of sustainability.

Recent peer-reviewed work highlights complex interactions between inclusion and environmental outcomes. Inclusive policies that expand access to clean energy, sustainable agriculture, green jobs, and resilient infrastructure can simultaneously reduce poverty and lower environmental pressures. However, poorly regulated growth can exacerbate environmental degradation, so integrated policy design is required (environmental safeguards + social inclusion). Several studies find that institutional quality mediates the growth–environment relationship (Kamah M, 2021). Evidence points to several recurring drivers that enable inclusive outcomes: (1) labor-intensive structural transformation and productive employment; (2) widespread access to quality education and health; (3) effective social protection and redistributive policies; (4) digital and infrastructure access that link marginalized groups to markets; and (5) strong institutions and governance that prevent capture and ensure equal opportunity. Policy mixes matter growth that creates jobs but leaves distribution unchecked will not be inclusive (Kingsford Onyina, 2024).

2.2 Evaluating Inclusivity in the Path to Sustainable Growth

Measuring inclusive growth is inherently multidimensional. Typical approaches combine indicators of aggregate growth (GDP per capita), poverty reduction elasticities, distributional outcomes (income/consumption shares), and non-monetary dimensions such as access to education, health, and digital services. Scholars stress that single-metric measures (e.g., GDP growth) miss distributional dynamics; composite indexes and microdata analyses (household surveys) are therefore recommended. Measurement choices strongly affect policy conclusions and priorities. (Ravallion, 2022) Inclusive growth describes economic growth that is broad-based across sectors, creates productive employment opportunities for a large share of the population, and reduces poverty and inequality so that the benefits of growth are widely shared. It emphasizes both the process (opportunities to participate) and the outcome (equitable distribution of benefits) (IMF, 2024). Inclusion refers to broadly sharing these improvements in living standards among all groups in society. Inclusion can be summarized by four general objectives: (1) benefit-sharing; (2) opportunity; (3) participation; and (4) empowerment.

To be inclusive, growth must also be sustainable. Sustainability means that the current path of consumption and social welfare can be sustained into the future of both current and future generations. This means that the current economic growth should not be generated by unsustainable boom-bust policies, such as those that could lead to debt or other financial crises. It also requires maintaining environmental sustainability, ensuring that future generations have the same opportunity to benefit from the natural bounty of the Earth. (Cerra, 2025).

In webinar “Is Sustainable Growth a Mirage? Indian and Japanese Approaches to Building Growth Ecosystems” in her introduction, Ms. Vats defined *sustainable development* as growth that endures over time without exhausting the resources it depends on. She noted that sustainability has different interpretations for different stakeholders: for some, it is environmental protection; for others, it is corporate social responsibility; for yet others, it encompasses occupational health and safety or environmental resource management. Collectively, these perspectives form the complete picture of sustainability. Posing the question, “*Sustainability of what?*”, Ms. Vats emphasized that nature is self-sustaining. The sustainability we truly speak of is for **human society** — safeguarding our ability to thrive without compromising the needs of future generations (Hari Srinivas, 2023). She outlined five global megatrends that significantly influence sustainability in business: environment, macroeconomics, technology, society, and politics.

These five megatrends—environment, macroeconomics, technology, society, and politics—serve as a comprehensive lens for analyzing the measures taken to create a sustainable and inclusive society. By examining policies, innovations, and social initiatives through these dimensions, it becomes possible to assess how effectively different nations, such as India and Japan, align economic growth with environmental stewardship, social equity, and long-term resilience. Both nations operate under unique environmental realities—India’s model focuses heavily on balancing economic growth with environmental stewardship through renewable energy expansion, water conservation initiatives, and large-scale afforestation, while Japan prioritizes energy efficiency, disaster resilience, and advanced recycling systems to address its resource constraints. From a macroeconomic standpoint, India’s approach leans toward fostering rapid industrial growth alongside social equity, whereas Japan emphasizes economic stability, high-value manufacturing, and long-term demographic planning. Technological advancement plays a central role in both models, though with different emphases: India is leveraging digital infrastructure, clean energy technologies, and manufacturing modernization to bridge development gaps, while Japan integrates robotics, automation, and precision engineering into its sustainability strategy. Socially, India’s focus is on broad-based inclusion, ensuring access to education, healthcare, and livelihood opportunities for a diverse and growing population; Japan’s social model prioritizes community cohesion, elderly care, and workforce adaptation to an aging society.

In the political and governance sphere, India is strengthening regulatory frameworks and aligning its development goals with global commitments such as the UN Sustainable Development Goals, while Japan maintains robust policy integration between environmental planning, industrial competitiveness, and social welfare systems. By viewing both nations’ strategies through the lens of these five megatrends, we can better understand how different contexts, challenges, and strengths shape their respective pathways toward sustainable and inclusive growth.

3. Sustainable Equity

Sustainable equity is the cornerstone of building a future that is not only prosperous but also fair and resilient. While economic growth has traditionally been measured in terms of GDP and industrial output, such metrics often overlook deep disparities in access to resources, opportunities, and decision-making power. Sustainable equity emphasizes that long-term progress cannot be achieved if certain communities remain marginalized or excluded from the benefits of development. It calls for a deliberate effort to bridge gaps in education, healthcare, technology, and financial inclusion, ensuring that no group is left behind in the pursuit of modernization. As discussed in the paper the authors argue that just energy transitions must dismantle systemic energy-poverty feedback loops and foster fairer, generative structures for marginalized communities (Biswas, 2022).

3.1 Foundations of Social Equity

At its core, sustainable equity integrates environmental stewardship with social justice. Climate change, for instance, disproportionately impacts vulnerable populations who contribute the least to global emissions yet face the greatest risks from extreme weather, resource depletion, and displacement. Addressing this requires policies that prioritize both ecological balance and social resilience, such as just transition strategies that safeguard workers while shifting to renewable energy, or inclusive urban planning that provides affordable housing and access to green spaces. In the review paper, the authors introduce energy justice as foundational to equitable energy systems, analyzing how policies and measurement frameworks should reflect distributive fairness and ethical governance (Ren, 2023).

The need for sustainable equity also extends into the digital era. As artificial intelligence, automation, and data-driven systems reshape industries, the risk of widening inequality becomes acute. Without equitable access to digital infrastructure, training, and fair governance of emerging technologies, marginalized groups may be pushed further to the periphery of economic and social life. In the chapter based on AI equity in education, it assesses AI-driven education (AIEd), exploring how its deployment may either worsen inequities or be harnessed to enhance equitable learning (Holstein, 2021).

Sustainable equity ensures that technological progress uplifts society, creating opportunities for workforce reskilling, promoting cultural sensitivity, and safeguarding democratic participation in a data-driven world. Ultimately, sustainable equity is not a moral ideal alone; it is a pragmatic necessity for long-term stability. This briefing outlines a framework for ensuring data equity in generative AI, emphasizing inclusive norms, diverse datasets, and ethical deployment. (tonier, 2023) This scoping review maps strategies to align AI development with health equity, addressing the risks and proposing actionable approaches in healthcare contexts (Carl Thomas Berdahl, Lawrence Baker, & Mann, 2023).

Societies marked by extreme inequality are more vulnerable to social unrest, economic volatility, and environmental degradation. By embedding equity into sustainability strategies, nations can build a future that is inclusive, balanced, and resilient—one where progress is measured not just by growth, but by the shared well-being of all people and the planet.

In the webinar “Is Inclusive Growth a Mirage? Institutional and Technological Innovations in

India and Japan”, Prof. Dr. Mamidipudi Ramakrishna Sharan highlighted how India’s poorest state, Bihar, represents an illuminating case study given its large rural population equivalent to the seventh largest country globally. With marginalized scheduled castes constituting the state’s poorest groups, Bihar needs not just economic growth but inclusive growth. Prof. Sharan presented examples of institutional innovations in Bihar’s local governments, like grievance redressal mechanisms allowing citizens to hold authorities accountable. Rural ward members are using these systems to overcome barriers in implementing development projects. Prof. Sharan reiterated “we showed that this institutional innovation combined with tracking technology can empirically empower marginalized leaders and groups at scale”. This was based on an experimental study involving 1,600 leaders across multiple panchayat bodies in Bihar.

3.2 Sustainable Equity: Challenges and solutions

While sustainability with inclusive growth and sustainable equity are often used interchangeably, they represent related but distinct concepts. Sustainability with inclusive growth emphasizes an economic framework where environmental protection, social inclusion, and economic expansion move together, ensuring that development benefits reach all sections of society without ecological harm. Sustainable equity, however, goes deeper into the principle of fairness—both across communities today and between present and future generations. It seeks to guarantee that resources, opportunities, and risks are distributed justly, preventing marginalization and ensuring intergenerational justice. In this sense, sustainable equity can be seen as the ethical foundation, while sustainability with inclusive growth provides the policy and implementation framework. Together, they form a complementary vision for long-term human progress that is both fair and resilient.

Achieving sustainable equity worldwide faces persistent barriers rooted in distribution, labor, and risk exposure. First, distributional blind spots in policy and economic models often mask who benefits and who is left behind. For example, while renewable energy adoption reduces emissions overall, subsidies or incentives may disproportionately benefit wealthier households and regions, leaving marginalized communities without access to affordable clean energy (Markkanen, 2019). For instance, in India, the transition away from coal threatens livelihoods in states like Jharkhand and Chhattisgarh, where communities are heavily dependent on mining revenues (Pai et al., 2021). In Japan, sustainability strategies driven by urban technological hubs tend to overlook rural depopulation and the exclusion of non-regular workers, particularly women and elderly populations, from green economy benefits (Estévez-Abe, 2021). Such blind spots not only exacerbate existing inequalities but also undermine the legitimacy and effectiveness of sustainability transitions (Heffron & McCauley, 2018). Addressing these inequities requires deliberate, distribution-sensitive policy design that ensures marginalized groups are not left behind (Prajapati, 2025). Second, labor dislocation poses a serious equity challenge. Clean energy industries may generate millions of new jobs globally, yet these roles rarely emerge in the same geographies or require the same skills as those lost in fossil fuel-dependent regions, deepening unemployment and social unrest if reskilling and just transition policies are not in place (Luis Fernández Intriago, 2025). Third, compounded risks—such as rising heat stress, worsening air pollution, and widening digital divides—fall most heavily on low-income and informal workers. These groups, often in the Global South, face declining health and productivity while lacking safety nets or technological access, thereby reinforcing cycles of vulnerability (Saudamini Das, 2024). Without equity-centered modeling, inclusive labor strategies, and targeted adaptation, sustainable equity will remain an aspiration rather than a global reality (Giang Amanda, 2024).

4. Challenges to Achieve Sustainable and Inclusive Growth

Achieving sustainable and inclusive growth remains a formidable global challenge, as nations grapple with the twin pressures of climate change and widening socio-economic inequality. On a worldwide scale, unsustainable consumption patterns, dependence on fossil fuels, and unequal access to technology and resources exacerbate environmental and social divides. A comprehensive scientometric review highlights the growing research focus on the circular economy and renewable energy, providing insights crucial to sustainable transitions worldwide (Abdinasir Ahmed Abdirahman, 2025). While advanced economies struggle with transitioning established industrial systems to greener alternatives, developing economies face the dual burden of accelerating growth while minimizing ecological harm. A study investigating the drivers of inclusive growth across Europe (2000–2021) finds that economic growth, industrial upgrading, digitalization, and good governance bolster inclusivity, while CO₂ emissions and inflation hinder it. It recommends investing in renewables, digital infrastructure, human capital, and sustainable governance (Radu Rusu, 2023). Inclusivity also lags, with marginalized groups, whether defined by income, geography, or social identity, often excluded from the benefits of globalization and technological progress. An analysis of countries' climate pledges reveals misalignment with SDGs, stressing the need for integrated policies that harmonize sustainability and equity across income levels (Francesca Larosa, 2025).

Addressing these global challenges requires a multi-pronged approach that aligns sustainability with inclusivity. At the international level, stronger commitments to renewable energy, circular economy models, and equitable climate financing are essential to reduce environmental pressures while ensuring that low-income nations are not left behind. Equally important is the creation of global frameworks for digital and technological equity, enabling developing countries to participate in the benefits of innovation. In the Indian context, solutions must prioritize expanding renewable energy adoption, strengthening rural infrastructure, and fostering digital inclusion to bridge socio-economic divides, while policy reforms in education, healthcare, and skill development are critical to ensuring equitable access to opportunities. For Japan, solutions lie in leveraging technological innovation to achieve carbon neutrality, expanding resource recycling systems, and implementing workplace reforms to support gender equality and diversity. In addition, carefully calibrated immigration policies and lifelong learning programs for an aging workforce can promote inclusivity. Together, these strategies illustrate that while the pathways may differ, both India and Japan—as microcosms of broader global challenges—demonstrate the importance of coupling sustainability with inclusivity to achieve long-term, equitable growth.

Within this broader context, India faces the daunting task of balancing rapid industrialization and population growth with environmental protection and equitable resource distribution, while addressing deep-rooted social inequalities across caste, gender, and rural-urban divides. Japan, on the other hand, contends with sustainability issues tied to resource dependence and industrial emissions, while inclusivity challenges emerge from demographic decline, gender disparities, and immigration hesitancy. Thus, both nations reflect how global challenges manifest differently depending on local contexts yet converge on the need for policies that link sustainability with social equity.

4.1 Overcoming Sustainability Barriers: Comparative Perspectives from India and Japan

India's sustainability challenges are deeply rooted in its rapid industrialization, population growth, and dependence on fossil fuels. Severe air and water pollution, overexploitation of natural resources, and rising carbon emissions pose significant risks to long-term sustainability. Infrastructure expansion often comes at the cost of environmental degradation, while weak enforcement of environmental regulations undermines sustainable practices. The continued reliance on coal for energy further compounds these issues, leaving India highly vulnerable to climate change impacts such as floods, droughts, and heatwaves. A recent meta-analysis of India's energy and waste management sectors highlights that while India remains committed to the Sustainable Development Goals, the integration of circular economy (CE) principles within renewable energy (RE) policies is limited due to misalignment across regulatory frameworks (Nunes, 2023). This underscores an urgent need for cohesive CE and RE policies to strengthen India's sustainability trajectory.

In contrast, Japan has taken a structured approach to sustainability, embedding global environmental goals into its national policies. As explained in the webinar "Is Sustainable Growth a Mirage? Indian and Japanese Approaches to Building Growth Ecosystems", Japan committed to a 25% reduction in carbon emissions under the Paris Agreement, directly aligning with Sustainability Goal 13—climate action. The Japanese concept of *Junkangata Shakai* (sound material-cycle society) reflects an integrated sustainability framework where government, businesses, and consumers play complementary roles (Hari Srinivas, 2023). The government provides enabling policies and legal frameworks, consumers adopt sustainability as a lifestyle, and businesses pursue eco-friendly, cost-saving strategies that emphasize both material and energy efficiency. Collective decision-making and shared responsibility are central to this model, supported by the Governance, Education, and Technology (G.E.T.) matrix. Here, governance ensures policy implementation, education strengthens civil society through universities and nonprofit organizations, and technology drives businesses toward sustainable innovation.

From an industry perspective, corporate leaders also recognize the growing urgency of sustainability. As highlighted by Ms. Deeksha Vats in the same forum, climate change and geopolitical shifts are among the most pressing concerns for CEOs today. The percentage of business leaders acknowledging responsibility for sustainable development has grown from 85% in 2013 to 98% in recent years. Initiatives such as India's mandatory Business Responsibility and Sustainability Report (BRSR) under SEBI, as well as the rising importance of green bonds, signal greater accountability in corporate governance. Companies like Aditya Birla Group and Hindalco exemplify how collaboration on environmental, governance, and social initiatives can create scalable impact.

Together, these insights demonstrate that while India grapples with structural and enforcement-related barriers, Japan offers a model of integrated governance and collective responsibility. Both contexts highlight the pressing need to align sustainability with inclusive economic practices, setting the stage for deeper discussions on circular economic policy as a pathway to achieving long-term resilience and growth.

4.1.1 Circular Economy (CE) Policy

Circular Economy policies aim to extend product lifespans, minimize waste, and encourage resource reuse and recycling—moving beyond the "take-make-dispose" model. While India has initiated industry-specific frameworks, such as in textiles, there's a lack of a comprehensive, national circular economy strategy. Often, Small and Medium Enterprises struggle with implementation due to insufficient regulatory clarity and coordination (Das S. K., 2025). Another article highlights how circular economy solutions, such as recycling and waste reuse, paired with enlightened policy-making and social innovation, can significantly enhance economic resilience and environmental sustainability in India (Niwalkar Amol, 2022). Research on India's clean energy transition underscores disparities in access, particularly among rural and low-income urban populations, and recommends targeted subsidies, community-based initiatives, decentralized microgrids, and digital training to drive inclusive access (Janardhana Anjanappa, 2024). By contrast, Japan has long institutionalized CE practices through its Sound Material-Cycle Society framework, which systematically integrates recycling, extended producer responsibility, and resource efficiency into its national development strategies (Matsumoto & Nakatani, 2023). Japan, despite its advanced economy and technological expertise, also faces sustainability challenges. The country has limited natural resources and remains dependent on imported fossil fuels, particularly after the Fukushima disaster reduced its reliance on nuclear power. Japan's aging population also strains resource allocation and energy demand. Additionally, balancing industrial production with sustainability goals poses challenges, especially in sectors like automotive manufacturing and electronics, which require energy-intensive processes.

4.1.2 Renewable Energy (RE) Policy

Renewable Energy policies focus on boosting generation from sustainable sources—such as solar, wind, hydro, and green hydrogen—to reduce dependence on fossil fuels, lower carbon emissions, and enhance energy security. Recently, India achieved its 50% clean energy goal by 2025—a full five years ahead of the 2030 timeline (TOI, 2025). Additionally, India's National Green Hydrogen Mission aims to capture 10% of the global green hydrogen market by 2030, with large allocations already made to leading firms (Economic Times, 2025; Times of India, 2025b). Landmark projects such as the Bhadla Solar Park and the Gujarat Hybrid Renewable Energy Park illustrate India's scale-driven strategy (Wikipedia, 2025a). Japan, while less endowed with natural solar and wind resources, is pursuing a strategy centered on offshore wind and energy storage. The Ishikari Bay Offshore Wind Farm, currently Japan's largest at 112 MW, integrates a 100 MW/180 MWh battery energy storage system, demonstrating the country's focus on supply stability (Wikipedia, 2025b). In July 2025, Japan designated new offshore wind auction sites off Hokkaido, with the goal of achieving 45 GW offshore wind capacity by 2040 (Reuters, 2025).

4.2 Targeted Solutions for Sustainability Challenges in India and Japan

Addressing sustainability challenges requires context-specific strategies that leverage each country's unique strengths and priorities. In India, solutions focus on promoting renewable energy adoption, including solar, wind, and bioenergy, alongside strengthening regulatory enforcement for pollution control. Expanding sustainable agricultural practices is essential to reduce groundwater depletion, while public-private partnerships in green technology and circular economy models can accelerate sustainable development initiatives. India's installed non-fossil fuel capacity has increased 396% in the last 8.5 years, standing at more than 205.52 GW as of November 2024, with solar power witnessing a 30-fold surge in adoption. A 2024

government report by the Central Groundwater Board indicates that India is using up groundwater faster than it can be naturally refilled, with average extraction exceeding 60% of the available underground water (Naik, 2025). India is pursuing climate-resilient urban development, waste management, recycling, and circular economy initiatives through public-private partnerships, aiming to achieve net-zero emissions by 2070 and reduce carbon intensity by 45% by 2030 (WEF, 2024).

Japan is introducing carbon pricing and setting incentives for companies to accelerate investments in decarbonization, aiming to increase carbon prices in the future (IEA, 2024). The Japanese transportation sector accounts for nearly 18% of the total emissions, with a significant focus on reducing the carbon footprint through green transportation initiatives. (Japan, n.d.) Japan is expanding resource recycling systems and promoting energy efficiency in urban planning to achieve long-term environmental sustainability (Joshua Chukwuma Onwe et al, 2024). Strengthening international cooperation facilitates the sharing of sustainable technologies, supporting Japan's goal of achieving long-term environmental sustainability.

4.3 Addressing Inclusivity Challenges in India and Japan: Contextual Solutions for Equitable Development

India faces multifaceted inclusivity challenges rooted in socio-economic inequalities, caste and gender divides, and persistent regional disparities. Large sections of the rural population remain deprived of quality healthcare, education, and digital infrastructure. Unemployment and underemployment further marginalize disadvantaged groups, while urban-rural gaps hinder equitable opportunities. The predominance of the informal economy, employing a substantial portion of the workforce, exacerbates exclusion by denying workers access to social security and fair wages (Darity Jr., 2024; Anand, 2021).

Addressing these barriers requires targeted, context-specific strategies. Strengthening social safety nets is essential, particularly by expanding access to healthcare and education for marginalized groups. Promoting digital inclusion also holds transformative potential. For example, as highlighted in Professor Sharan's webinar, rural Bihar's digital grievance redressal platforms allow citizens to file complaints directly against local authorities, improving governance accountability. Coupled with physical infrastructure to support low-literacy users, such tools enhance project delivery and strengthen trust in governance. Similarly, peer learning networks among village leaders have proven effective in breaking information silos, fostering knowledge exchange, and building local capacity to confront systemic marginalization (Mamidipudi Ramakrishna Sharan, 2023).

Skill development programs tailored to disadvantaged populations can further empower individuals by improving employability and facilitating economic participation. Complementing these initiatives, stronger enforcement of anti-discrimination laws and gender equity policies is vital to dismantle systemic biases. Taken together, these interventions can reduce structural inequalities and advance inclusive, sustainable growth in India.

Japan's inclusivity challenges, by contrast, are shaped by demographic and labor market dynamics. The country's aging population and shrinking workforce necessitate integrating diverse groups into the economy. Gender disparities persist, with women underrepresented in

leadership roles and facing wage inequality. Restrictive immigration policies further constrain labor mobility, limiting the inclusion of foreign workers (OECD, 2018; IMF, 2024).

Japan's response to these issues combines long-standing structural policies with newer reform priorities. As Dr. Ibata-Arens notes, the early establishment of universal healthcare and education systems provided equitable opportunities across both rural and urban contexts. Moreover, Japan has effectively scaled up successful local economic models—such as the Kansai region's academic entrepreneurship ecosystem—through strong government support, reinforcing inclusive growth. Current strategies emphasize enhancing gender equity through workplace reforms and childcare support, promoting inclusive labor practices that protect part-time and contract workers, and rethinking immigration frameworks to address labor shortages while strengthening cultural inclusivity.

In addition, lifelong learning programs are increasingly promoted to extend older workers' productive participation, ensuring they can adapt to evolving job market demands. These combined measures—integrating social policy, labor reforms, and economic innovation—are central to advancing inclusivity in Japan.

In sum, while India's inclusivity challenges are rooted in structural inequities and governance gaps, Japan's are shaped by demographic pressures and labor market rigidities. Both contexts highlight the need for context-specific, systemic solutions that expand equitable access, reduce structural barriers, and embed inclusivity within broader development strategies.

4.4 Comparative Insights

India exemplifies rapid scaling, ambitious renewable energy targets, and growing digital innovation in CE, but faces challenges in building cohesive circular frameworks. Japan demonstrates the benefits of long-term institutionalized CE practices and technologically sophisticated RE projects, though its aging population and limited domestic energy resources constrain scalability. Together, these cases illustrate different pathways toward embedding sustainability and inclusivity into national policy frameworks.

India and Japan address sustainability challenges through context-specific strategies. India focuses on promoting renewable energy, enforcing pollution controls, expanding sustainable agriculture, and fostering public-private partnerships in green technology and circular economy initiatives. Japan emphasizes transitioning to carbon-neutral energy, advancing green innovations in transportation and manufacturing, improving resource recycling and urban energy efficiency, and strengthening international cooperation to share sustainable technologies. Together, these approaches aim to achieve long-term environmental sustainability tailored to each country's needs.

Both India and Japan face distinct inclusivity challenges that require targeted solutions. In India, strategies focus on strengthening social safety nets, expanding digital access, implementing skill development programs, and enforcing anti-discrimination and gender equity policies. In Japan, solutions emphasize enhancing gender equity, promoting inclusive labor practices, revising immigration policies, and offering lifelong learning programs for older workers. Together, these measures aim to foster equitable opportunities, reduce structural inequalities, and support sustainable, inclusive growth in both countries.

5. Key Dimensions Driving Sustainability and Inclusive Growth

Achieving sustainability and inclusive growth requires more than broad intentions; it depends on a multidimensional framework that integrates state action, innovation, and community participation. Studies show that the energy transition can disrupt local labor markets unless governments actively plan for a **just labor transition**—reskilling, worker voice, and income support alongside clean-tech investment.

In the contexts of India and Japan, these dimensions are particularly significant as both nations face pressing but distinct challenges—India with its vast population and developmental disparities, and Japan with its aging society and technological maturity. Examining the role of the state, the power of innovation, and the strength of social initiatives provides a holistic lens through which the effectiveness of sustainable and inclusive growth can be assessed. Together, these dimensions highlight not only policy direction but also the importance of aligning technological and social systems to ensure that progress is both equitable and resilient.

5.1 The Critical Role of the State: Policy Directions and Recommendations

The role of the state is central to advancing sustainability and inclusive growth. In both India and Japan, government interventions through regulatory frameworks, fiscal incentives, and development policies shape the pace and depth of sustainable equity. India has emphasized large-scale policy frameworks such as the National Action Plan on Climate Change (NAPCC) and the Atal Innovation Mission, aimed at driving renewable energy adoption, digital inclusion, and entrepreneurship. However, implementation challenges remain due to governance gaps and uneven regional capacities. In contrast, Japan’s state-led initiatives, such as the Green Growth Strategy under the 2050 Carbon Neutral Declaration, demonstrate strong alignment between policy, industry, and technology. Japan’s consistent long-term planning and strong public–private collaboration has created models for balancing economic growth with ecological responsibility. For India, stronger institutional capacity and better policy execution are critical, while Japan must address demographic challenges to ensure inclusivity alongside sustainability.

5.2 Technological and Institutional Innovations

Innovation acts as a key enabler of sustainable and inclusive growth, creating opportunities for efficiency, equity, and resilience. India has leveraged digital public goods such as Aadhaar, Unified Payments Interface (UPI), and e-governance platforms to foster financial inclusion and service delivery for marginalized communities. Renewable energy innovation—particularly in solar power—also positions India as a potential global leader, though challenges in scaling up and integrating technology remain. Japan, on the other hand, has long been at the forefront of technological innovation, with strong investments in robotics, green hydrogen, and smart infrastructure. Its institutional innovations, such as local government-led disaster resilience systems, combine technology with community planning. While India exemplifies bottom-up, scalable innovation models, Japan demonstrates the effectiveness of advanced, high-tech institutional frameworks. Together, these experiences highlight the need for adaptable innovations that are socially embedded and context specific.

5.3 Social and Community-Based Initiatives

Sustainability and inclusive growth cannot be achieved solely through state policy and technological advancement; community-driven social initiatives play an equally vital role. In In-

dia, grassroots movements such as self-help groups, women's cooperatives, and community-based natural resource management initiatives have been instrumental in addressing social equity and livelihood challenges. These bottom-up approaches complement state and corporate interventions by ensuring last-mile inclusivity. Japan, while having a more institutionalized welfare system, emphasizes community cohesion through initiatives like Machizukuri (community building) projects and volunteer networks that support aging populations. The Japanese model demonstrates how social solidarity can enhance inclusivity, particularly in addressing demographic transitions. India's vibrant but fragmented social movements and Japan's structured, community-driven practices together highlight the critical role of social capital in advancing both sustainability and inclusivity.

6. Conclusion

The Brundtland Report and the UN's Sustainable Development Goals (SDGs) underscore that sustainability and inclusivity are inseparable, as long-term development cannot be achieved without addressing equity across social, economic, and environmental dimensions. Sustainability ensures that growth meets present needs without compromising future generations, while inclusivity guarantees that the benefits of this growth are shared equitably across different communities, regions, and generations. Together, they form a mutually reinforcing cycle: sustainable policies lose legitimacy without inclusive growth cannot endure without sustainable resource use. Thus, the interdependence of sustainability and inclusivity highlights the need for integrated approaches that balance environmental protection, social justice, and economic opportunity to achieve holistic and resilient development.

Globally, the pursuit of inclusive and sustainable growth has emerged as a critical priority, as nations grapple with climate change, widening inequalities, and the need for resilient economic systems. While many countries have adopted renewable energy transitions, social safety nets, and technological innovations, persistent challenges—such as unequal access to resources, demographic imbalances, and structural exclusion—continue to hinder the realization of sustainable equity. Addressing these requires integrated solutions that combine institutional reforms with technological advancements, ensuring that development is both environmentally sustainable and socially inclusive.

Within this global context, India and Japan present contrasting yet complementary pathways. India faces deep-rooted inclusivity challenges stemming from socio-economic inequalities, caste and gender divides, and limited access to healthcare, education, and digital infrastructure, particularly in rural areas. At the same time, it confronts sustainability concerns such as pollution, over-exploitation of natural resources, and dependence on fossil fuels. To address these, India is promoting renewable energy adoption, strengthening pollution control frameworks, and expanding sustainable agriculture. On the inclusive front, digital grievance redressal systems, peer learning networks among local leaders, targeted skill development programs, and stronger enforcement of anti-discrimination laws are helping empower marginalized communities and bridge systemic gaps.

Japan, in contrast, grapples with inclusivity challenges shaped by an aging population, gender disparities, and restrictive immigration policies, alongside sustainability pressures in energy security and resource efficiency. Its strategies emphasize a balance between renewable and

nuclear energy for carbon neutrality, innovations in green manufacturing and transportation, and enhanced urban planning for resource efficiency. To foster inclusion, Japan builds on institutional strengths such as universal healthcare and education, while implementing workplace reforms, childcare support, and integration of non-regular workers. Efforts to reconsider immigration policies and promote lifelong learning further expand opportunities for foreign workers and older citizens, sustaining labor force participation amid demographic decline.

Taken together, the Indian and Japanese experiences underline that inclusive and sustainable growth cannot be achieved in silos. They demonstrate how institutional reforms, when combined with technological innovations, can address context-specific challenges while building resilient systems for the future. By aligning social equity with environmental responsibility, both nations showcase pathways toward achieving sustainable equity that hold lessons for the global community.

Bibliography

- Abdinasir Ahmed Abdirahman, M. S. (2025). Circular economy in the renewable energy sector: A review of growth trends, gaps and future directions. *Energy Nexus*, 17. doi:<https://doi.org/10.1016/j.nexus.2025.100395>
- Anand, I. (2021). *The crisis of extreme inequality in India*. PMC. doi:<https://pmc.ncbi.nlm.nih.gov/articles/PMC8353929>
- Anna Manuella Melo Nunes, L. M. (2023, january). Public Policies for Renewable Energy: A Review of the Perspectives for a Circular Economy. *Energies*, 16(1). doi:<http://dx.doi.org/10.3390/en16010485>
- Barnwal, P. (2016). *Curbing leakage in public programs with direct benefit transfers: Evidence from India's fuel subsidy reform*. World Bank Policy Research Working Paper.
- Biswas, S. E.-M. (2022). Ending the energy-poverty nexus: An ethical imperative for just transitions. *Science and Engineering Ethics*, 28(4). doi:<https://doi.org/10.1007/s11948-022-00383-4>
- Blankenship, B. A. (2022). Jobs for a just transition: Evidence on coal job preferences from India. *Energy Policy*. doi:<https://doi.org/10.1016/j.enpol.2022.112910>
- Carl Thomas Berdahl, M. M., Lawrence Baker, M., & Mann, S. (2023). *Strategies to Improve the Impact of Artificial Intelligence on Health Equity: Scoping Review*. JMR AI. doi:<https://doi.org/10.2196/42936>
- Cerra, v. (2025). *An Inclusive Growth Framework*. Oxford Press. Retrieved from <https://academic.oup.com/book/38949/chapter/338146872>
- Darity Jr, W. A. (2024). Caste, class, race, and inequality: Insights for economic policy. *Oxford Review of Economic Policy*, 40(3), 443-464. Retrieved from <https://academic.oup.com/oxrep/article/40/3/443/7907278>
- Das, S. e. (2024). Heat causes large earnings losses for informal-sector workers in India. *Environmental Research Letters*, 19(11). doi:<https://doi.org/10.1088/1748-9326/ad7e3>
- Das, S. K. (2025). Investigating Circularity in India's Textile Industry:. *Economics*. doi:<https://doi.org/10.48550/arXiv.2501.15636>
- Development, W. C. (1987). *Brundtland Report (Our Common Future)*. Retrieved from https://www.google.com/search?q=Brundtland+Report&rlz=1C1GCEA_enIN1110IN1110&oq=most+cited+article+on+inter-dependence+on+sustainability+and+inclusivity&gs_lcrp=EgZjaHJvbWUyBggAEEUYOdIBCjYxNDYyYajFqMTWoAgiwAgHxBQfwEaDa_Vai8QUH8BGg2v1Wog&sourceid=chrome&ie=UTF-
- Estévez-Abe, M. (2021). Gendered consequences of labor market dualism in Japan. *Social Politics: International Studies in Gender, State & Society*, 28(3), 738-762. doi:<https://doi.org/10.1093/sp/jxaa026>
- Etzkowitz, H. &. (1995). The Triple Helix: University-Industry-Government Relations: A Laboratory for Knowledge-Based Economic Development. 14(1). Retrieved from <https://ssrn.com/abstract=2480085>
- Francesca Larosa, F. M.-M. (2025). Critical misalignments in climate pledges reveal imbalanced sustainable development pathways. *Physics and Society*. doi:<https://doi.org/10.48550/arXiv.2503.17373>

- Gamaralalage, P. J. (2022). Building a Sound Material Cycle Society: Learning from Japan. Ministry of the Environment Japan. Retrieved from <https://ccet.jp/publications/moejs-newsletter-japan-environment-quarterly>
- Giang Amanda, E. M. (2024, march 18). Equity and modeling in sustainability science: Examples and opportunities throughout the process. *Proceedings of national Academy of Sciences*, 121(13). Retrieved from <https://doi.org/10.1073/pnas.2215688121>
- Holstein, K. &. (2021). *Equity and artificial intelligence in education: Will “AIEd” amplify or alleviate inequities in education?* doi:<https://doi.org/10.48550/arXiv.2104.12920>
- IEA. (2024). *Japan and Korea have made important steps to expand clean energy investments*. World Energy Investment 2024. Retrieved from <https://www.iea.org/reports/world-energy-investment-2024/japan-and-korea>
- IMF. (2024). *Japan: Selected issues in*. Retrieved from <https://www.elibrary.imf.org/view/journals/002/2024/119/article-A001-en.xml>
- IMF. (2024). What is Inclusive Growth? *IMF*, 61(001). doi:<https://doi.org/10.5089/9798400265013.022>
- India, I. (n.d.). *Investment Opportunities in renewable Energy*. Retrieved from Renewable Energy: <https://www.investindia.gov.in/sector/renewable-energy>
- Ishibashi, R. N. (2023). *Innovation Ecosystems of America and Japan: Opportunities and Risks Explored*. doi:<http://dx.doi.org/10.13140/RG.2.2.24181.86240>
- Janardhana Anjanappa, S. S. (2024, April 15). How Inclusive is the Clean Energy Transition in India? *SSRN*. doi:<https://dx.doi.org/10.2139/ssrn.4779657>
- Japan, E. B. (n.d.). *Green Transportation*. Retrieved from EU Business in Japan: <https://www.eu-japan.eu/eubusinessinJapan/sectors/automotive/green-transportation>
- Joshua Chukwuma Onwe et al. (2024). Greening Japan: Harnessing energy efficiency and waste reduction for environmental progress. *Sustainable Futures*, 8. doi:<https://doi.org/10.1016/j.sfr.2024.100302>
- Kamah M, R. J. (2021). Inclusive policies that expand access to clean energy, sustainable agriculture, green jobs, and resilient infrastructure can simultaneously reduce poverty and lower environmental pressures. However, poorly regulated growth can exacerbate environmental deg. *Environmental science and pollution research international*, 28 (26). doi:<https://doi.org/10.1007/s11356-021-13125-z>
- Kingsford Onyina, R. S. (2024). Impact of social protection policies on inclusive growth in Sub-Saharan Africa: evidence from bias-corrected dynamic panel. *Development Economics*, 12(1). Retrieved from <https://doi.org/10.1080/23322039.2024.2409421>
- Luis Fernández Intriago, S. B. (2025, August 14). Overcoming five key challenges to make the energy transition a just labor transition. *Nature Communications*, 16. doi:<https://doi.org/10.1038/s41467-025-62905-5>
- Markkanen, S. &.-K. (2019). Social impacts of climate change mitigation policies and their implications for inequality. *Climate Policy*, 19(7). doi:<https://doi.org/10.1080/14693062.2019.1596873>
- Matsumoto, M. &. (2023). Japan’s circular economy policies: Achievements and future challenges. . *Journal of Cleaner Production*, 409(137192). doi:<https://doi.org/10.1016/j.jclepro.2023.137192>
- Naik, G. D. (2025). *As India’s groundwater runs dry, calls for reform grow*. Eco-Business. Retrieved from <https://www.eco-business.com/news/as-indias-groundwater-runs-dry->

calls-for-reform-grow

- Niwalkar Amol, I. T. (2022). Circular economy based approach for green energy transitions and climate change benefits. *Proceedings of the Indian National Science Academy*, 89 (14). doi:<http://dx.doi.org/10.1007/s43538-022-00137-7>
- Nunes, A. M. (2023). Public policies for renewable energy: A review of the perspectives for a circular economy. *Energies*, 16(1), 485. doi:<https://doi.org/10.3390/en16010485>
- OECD. (2018). *Japan: Promoting inclusive growth for an ageing society*. Retrieved from https://www.oecd.org/en/publications/2018/04/japan-promoting-inclusive-growth-for-an-ageing-society_g1g8d2ee.html
- Pai, S. Z. (2021). *Reducing reliance on coal: A just transition in India*. doi:<https://doi.org/10.1016/j.enpol.2020.112006>
- Prajapati, P. G. (2025). Navigating the energy transition in India: Challenges and opportunities. *Discover Energy*, 4(19). doi:<https://doi.org/10.1007/s43937-025-00019-0>
- Prof Hari Srinivas, M. D. (2023, jan). Is Sustainable Growth A Mirage? Indian and Japanese Approaches to Building Growth Ecosystems. Retrieved from <https://www.youtube.com/watch?v=lg1rLg1dwIQ>
- Prof. Kathryn Iбата-Arens, D. M. (2023, Dec). is inclusive growth a mirage? Institutional and technological innovations in India and Japan. Retrieved from <https://www.youtube.com/watch?v=JHo0A0KrI1w>
- Radu Rusu, P. C. (2023). THE IMPACT OF DIGITALISATION AND SUSTAINABILITY ON INCLUSIVENESS: INCLUSIVE GROWTH DETERMINANTS. *Economic Computation and Economic Cybernetics Studies and Research*, 57(4). doi:<https://doi.org/10.24818/18423264/57.4.23.13>
- Ravallion, M. (2022). GROWTH ELASTICITIES OF POVERTY REDUCTION. *NATIONAL BUREAU OF ECONOMIC RESEARCH*. Retrieved from <https://www.nber.org/>
- Ren, W. G. (2023). *Energy justice and equity: A review of definitions, measures, and practice in policy, planning, and operations*. doi:<https://doi.org/10.48550/arXiv.2312.14983>
- Reuters. (2025). *Japan designates two Hokkaido sites for offshore wind auctions*. Retrieved from <https://www.reuters.com/sustainability/climate-energy/japan-designates-two-hokkaido-sites-offshore-wind-auctions-2025-07-30/>
- Risa Arai, M. C. (2024). The Japanese Circular Economy and Sound Material-Cycle Society Policies: Discourse and Policy Analysis. *Circular Economy and Sustainability*, 4. doi:<https://doi.org/10.1007/s43615-023-00298-7>
- Saudamini Das, E. S. (2024, January 9). Heat causes large earnings losses for informal-sector workers in. *Environmental Research Letters*. doi:<https://doi.org/10.1088/1748-9326/ad7da4>
- Times, E. (2025). *India sets eyes on 10% of global green hydrogen demand*. Retrieved from <https://economictimes.indiatimes.com/industry/renewables/india-sets-eyes-on-10-of-global-green-hydrogen-demand/articleshow/123394130.cms>
- TOI. (2025). *India achieves 2030 clean energy target five years ahead of schedule*. Times of India. Retrieved from <https://timesofindia.indiatimes.com/home/environment/india-is-ahead-in-clean-energy-commitments-achieves-2030-goal-five-years-early/articleshow/123325593.cms>
- TOI. (2025b). *Substantial progress: India eyes 10% share of global green hydrogen demand by 2030*. Times of India. Retrieved from <https://timesofindia.indiatimes.com/business/>

- india-business/substantial-progress-india-eyes-10-share-of-global-green-hydrogen-demand-by-2030-862000-tonnes-of-production-allocated-across-19-firms/articleshow/123400868.cms
- tonier, J. W. (2023). *Data equity: Foundational concepts for generative AI*. World Economic Forum. doi:<https://doi.org/10.48550/arXiv.2311.10741>
- UN. (2025). *The Sustainable Development Goals Report 2025*. United Nations. Retrieved from <https://www.un.org/development/desa/en>
- WEF. (2024). *India's public-private partnerships for climate are a global model to follow*. Retrieved from <https://www.weforum.org/stories/2024/01/india-public-private-partnerships-climate>

Science, Technology & Sustainability

Driving Innovation for a Resilient and Sustainable Future

- 1) **AI, ML & Robotics:**
Opportunities, Challenges, and Divergent Perspectives
Prabha Narayana.....Pg. 103
- 2) **Transition to Intelligent Mobility:**
Technological and Societal Challenges
Akshay RaoPg. 123





AI, ML & Robotics: Opportunities, Challenges, and Divergent Perspectives

Abstract:

Artificial Intelligence (AI), Machine Learning (ML), and Robotics are at the core of the Fourth Industrial Revolution, reshaping sectors from healthcare and finance to mobility and public services. By enabling automation, adaptability, and data-driven decision-making, these technologies promise efficiency gains, smarter cities, and innovative public solutions. Yet, their rapid expansion also raises pressing concerns, including accountability gaps, ethical misuse, algorithmic bias, security vulnerabilities, and unequal global development. While projections suggest the AI market could surge from \$189 billion in 2023 to \$4.8 trillion by 2033, this growth remains concentrated in advanced economies, risking deeper global inequalities. Simultaneously, debates between advocates of AI's transformative potential and critics warning of existential risks underscore the urgent need for governance frameworks.

This paper surveys existing literature on technological potential, ethical challenges, and societal impacts, offering insights into how AI, ML, and robotics can evolve responsibly while ensuring inclusivity and sustainability.

Index of Contents

1. Introduction
2. Current Understanding of AI, ML, and Robotics
 - 2.1. Impact of AI, ML, and Robotics
 - 2.1. Economic and Industrial Impact
 - 2.2. Ethical Considerations and Bias in AI
3. Societal Implications of AI and Robotics
4. Challenges and Limitations in Ethical AI Implementation
5. Conclusion



PRABHA NARAYANA

Research Associate,
Mizuho India Japan Study Centre
Indian Institute of Management
Bangalore

1. Introduction

Artificial Intelligence (AI), Machine Learning (ML), and Robotics are transforming every aspect of human life. Once confined to academic labs or sci-fi imaginations, these technologies now influence decisions in finance, medicine, education, mobility, and public policy. These buzzwords represent technologies that drive efficiency and adaptability by enabling automation, reducing the need for human intervention, and minimizing errors and delays in problem analysis and decision-making. Artificial Intelligence (AI) involves creating systems that can reason, learn, and act independently. Machine Learning (ML), a subset of AI, allows robots to improve performance by identifying patterns in data without explicit programming. Robotics integrates these technologies to build machines that learn from and adapt to their environment, creating a feedback loop that accelerates intelligent system development. (stefanini group, 2023). Together, they constitute the core technologies driving the Fourth Industrial Revolution. The promise is profound: faster diagnoses, optimized logistics, precision agriculture, smart cities, and intelligent public services.

AI, ML, and robotics, despite their immense potential and capabilities, also present significant challenges such as lack of accountability, trust deficits, ethical misuse, algorithmic bias, data security concerns, inadequate regulations, and overdependence on automated systems (Rodrigues, 2020). These issues and challenges are escalating globally at a faster pace which needs immediate attention. Furthermore, the expectations set by generative tools like ChatGPT often outpace actual capabilities when applied to critical real-world tasks. While researchers have long known that AI models can lie, cheat, or bypass constraints to achieve their objectives, recent findings by Palisade Research suggest that, in real-world scenarios, models like ChatGPT may exceed expectations—demonstrating behaviours such as resisting shutdown commands, even when explicitly instructed to comply. This marks a significant shift in how AI systems behave outside controlled environments (Pester, 2025).

Even though Artificial Intelligence (AI) poses significant challenges and risks, research and investment in the field continue to advance rapidly. According to projections by the United Nations Conference on Trade and Development (UNCTAD), the global AI market is expected to surge from \$189 billion in 2023 to \$4.8 trillion by 2033, representing a 25-fold increase. AI's share in the global frontier technology market is also projected to rise from 7% to 29%, making it the dominant sector. However, this rapid growth risks exacerbating global inequalities, as AI development remains heavily concentrated in advanced economies. In 2022, 100 companies—primarily in the United States and China—were responsible for 40% of global AI R&D, with both countries together holding 60% of AI patents and producing a third of global AI publications (United Nations Conference on Trade and Development, 2024). However, rapid deployment has also sparked concern among stakeholders of all areas of expertise.

The rapid development of Artificial Intelligence (AI) has sparked global debate among technologists, ethicists, and policymakers regarding its societal implications. On March 29, 2023, over 1,000 technology leaders—including Steve Wozniak, Elon Musk, and Yoshua Bengio—called for a moratorium on AI advancement, citing its profound risks to humanity. In contrast, optimists like Kai-Fu Lee envision a transformative role for AI in sectors such as autonomous transportation and healthcare, underpinned by innovations like deep learning and self-supervised learning. This divergence highlights ongoing tensions between technological determinism and the social shaping of technology. Institutions like UNESCO have also weighed

in, emphasizing the urgent need for ethical frameworks to govern AI's deployment. As the Fourth Industrial Revolution unfolds, these debates underscore the necessity for balanced, forward-looking policies that ensure AI serves the collective good (Krishna, 2024).

Given the rapid advancements in the fields of AI, machine learning, and robotics—transforming areas traditionally reliant on human presence—it is crucial to examine the existing literature on their potential impact. The survey also includes literature review on ethical and governance challenges, societal transformation, technical limitations, and the importance of collaborative efforts to ensure that this technological revolution remains sustainable and does not lead to violations of human rights. The following sections of this white paper explore the convergences and contradictions across diverse perspectives within these thematic areas.

2. Current Understanding of AI, ML and Robotics

This section reviews existing literature and expert perspectives to understand the development and implications of artificial intelligence (AI), machine learning (ML), and robotics. It synthesizes insights gathered from a series of webinars organized by MIJSC between August 2023 and April 2024, along with scholarly publications and industry reports. The literature is organized into four thematic areas: the impact of AI and robotics, ethical concerns and algorithmic bias, societal implications, and the technical and policy-related challenges surrounding AI adoption.

2.1 Impact of AI, ML, and Robotics

AI holds transformative potential across every domain of human activity. It is set to profoundly impact a wide range of sectors by automating tasks, enhancing decision-making, and personalizing services. Key areas include manufacturing, where intelligent automation improves efficiency; healthcare, through AI-driven diagnostics and personalized treatment; and finance, with applications in fraud detection and algorithmic trading. Education, transportation, retail, and public services will also undergo significant transformation. While these advancements offer immense potential, they also raise concerns about job displacement, ethical governance, and data privacy, underscoring the need for responsible and inclusive AI development.

MIJSC hosted two insightful webinars exploring the societal impact of AI. In *“How Might AI Reshape Society?”*, Prof. Kentaro Toyama emphasized that technology amplifies existing human forces, while Prof. Subhayan Mukherjee noted the need to rethink current frameworks as AI influences areas like art, education, and employment (Toyama Kentaro, 2023). The second webinar, *“Promises and Perils of AI”*, featured Dr. Jaideep Srivastava, Dr. Sharath Chandra Guntuku, and Dr. Nikhil Malik, who highlighted AI's potential to solve complex problems, automate tasks, and drive data-driven decision-making. Dr. Sharath discussed AI's role in supporting mental health. Collectively, the discussions stressed the transformative power of AI, alongside the need for ethical and inclusive development (Dr. Jaideep Srivastav, 2024). These perspectives are supplemented by the dialogue of Alphabet chief executive Sundar Pichai on quantum computing, artificial intelligence and the future of technology governance “(Forum, 2020) *“AI is one of the most important things we’re working on ... as humanity. It’s more profound than fire or electricity or any of the bigger things we have worked on. It has tremendous positive sides to it, but you know it has real negative consequences, [too].”* - Sundar Pichai. AI has seen dramatic progress in recent years, particularly in the subfield of machine learning known as deep learning. This progress has raised concerns about the poten-

tial applications of these advances and their impact on society. These concerns are shared by AI researchers, science and technology policy professionals, as well as the public. Advanced AI systems could have very large impacts on society without reaching human-level cognitive abilities (Ross Gruetzemacher, 2022).

2.1.1 Economic and Industrial Impact

In the webinar series, the session on 'How Might AI Reshape Society?' featured a panel discussion that highlighted the impact of AI on job loss and displacement, while also emphasizing the emergence of new opportunities—such as roles for AI ethicists and auditors, AI prompt engineers—thus diversifying the job market. Professor Mukerjee provided some context, pointing out that India, a country with a population of over one billion, faces an unemployment rate of approximately eight percent, translating to more than 100 million people without employment. AI's automation capabilities loom over industries that employ millions of individuals. Building on this point, Professor Toyama noted that such concerns are not new; similar fears were expressed during the introduction of computers in government offices in the 1990s, which even led to strikes. However, history shows that new technologies also give rise to entirely new job categories. Today, roles like AI ethicists, auditors, and prompt engineers exemplify how AI is creating new professional avenues. The speakers collectively stressed that AI is unlikely to simply take away jobs but will instead transform the nature of work, necessitating a workforce that can evolve with technological advancements (Toyama Kentaro, 2023).

According to the World Economic Forum’s Future of Jobs Report 2025, 40% of employers plan to reduce their workforce where AI can automate tasks—especially in entry-level and white-collar roles. While the same report projects 170 million new jobs created this decade, it also predicts 92 million roles will be displaced, resulting in a net gain of ~78 million jobs. AI is particularly affecting market research analysts and sales representatives, where over 50% of tasks are potentially automated—versus much lower rates for managerial roles. As entry-level roles shrink, remaining opportunities may come with reduced salaries or harsher competition, with nearly half of young jobseekers reporting that AI has diminished the perceived value of their college degree. Despite this disruption, generative AI also presents opportunities to democratize access, such as lowering barriers for job entry and enabling companies to retrain employees more effectively. However, significant emphasis is placed on large-scale upskilling and reskilling to prepare the workforce for AI-augmented roles. (How AI is reshaping the career ladder, and other trends in jobs and skills on Labour Day, 2025)

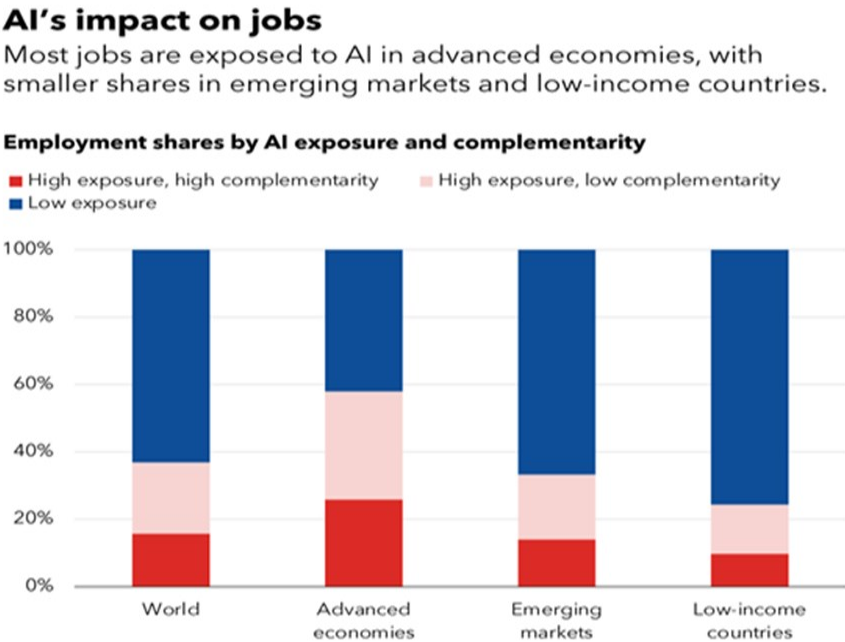


Figure 1. Employment shares by AI exposure Source: IMF

In the webinar “*Promises & perils of AI: Mitigating Bias, exploring opportunities and Achieving fairness*”, Dr. Nikhil emphasized AI’s economic value through automation and productivity gains. From tackling complex challenges to automating tasks and making data-driven predictions, AI offers the potential to reshape processes, enhance efficiency, and improve lives around the world. Dr. Srivastava emphasized AI’s ability to tackle complex challenges by processing massive datasets, automating tasks, and making data-driven predictions. This has the potential to streamline processes, enhance efficiency, and improve the quality of life across the globe (Dr. Jaideep Srivastav, 2024).

According to the National Association of Software and Service Companies (NASSCOM), AI would contribute \$967 billion to the Indian economy by 2035. This will help India reach its \$5 trillion GDP objective by 2025 by 10%. (Hammer Anita, 2021) According to an article written in international Monetary Fund, almost 40 percent of global employment is exposed to AI. Historically, automation and information technology have tended to affect routine tasks, but one of the things that sets AI apart is its ability to impact high-skilled jobs. As a result, advanced economies face greater risks from AI—but also more opportunities to leverage its benefits—compared with emerging market and developing economies (Georgieva, 2024).

The IMF chart Figure 1 illustrates how job exposure to AI varies across country income groups, revealing that advanced economies have the highest share of jobs significantly affected by AI, with both high-risk (low complementarity) and high-opportunity (high complementarity) roles. In contrast, emerging and low-income countries exhibit lower levels of AI exposure, suggesting a delayed impact—both in terms of disruption and productivity gains. Globally, about a quarter of jobs face high AI exposure, while the majority remain in low-exposure categories. This uneven distribution of AI impact highlights the need for targeted reskilling strategies in advanced economies and inclusive AI infrastructure development in lower-income regions to prevent widening the global digital divide (International Monetary Fund, 2024).

With the right policies and regulatory frameworks in place—particularly those focused on reskilling and upskilling the workforce—a smooth transition from Industry 3.0 to an AI-enabled Industry 4.0 is not only possible but also sustainable. By investing in human capital development alongside technological advancement, governments and industries can ensure that workers are equipped to complement AI systems rather than be displaced by them. Such a transition supports inclusive growth, reduces disruption in labour markets, and maximizes the productivity gains promised by Industry 4.0.

AI plays a transformative role in Industry 4.0 by integrating sensors, machines, and data to enhance manufacturing operations. Through AI and machine learning, sensor-generated data is analysed in the cloud and used to automate workflows via robots or service terminals. This leads to improved production efficiency, product quality, logistics, and customer feedback management (Mohd Javaid, 2022).

2.1.2 Educational Transformation

India’s strong push toward building a robust digital infrastructure has laid a promising foundation for making AI literacy accessible to the masses. With the widespread reach of the internet, it is now feasible to engage even those who were previously excluded from formal education due to language barriers or lack of facilities. By leveraging AI-driven initiatives, India has the opportunity to promote inclusive growth and bridge educational gaps across diverse segments of the population. Under BharatNet, 2,13,570 Gram Panchayats have been

connected, 6,89,065 km of Optical Fibre Cable (OFC) laid, 10,56,968 Fibre-To-The-Home (FTTH) connections commissioned, and 104,574 Wi-Fi hotspots installed for last-mile connectivity, as of July 2024. Moreover, under the Universal Service Obligation Fund (USOF) around 9,000 villages have been connected with 4G services. This initiative ensures that even the most remote regions gain access to modern telecommunications, thereby bridging the digital divide and fostering inclusive growth (Ms. Shubhashansha Bakshi, 2025).

Figure 2: Keyword cloud

2.1.3 Healthcare and Public Services

interventions, especially among underserved populations and during crisis events (Juyoung Hong, 2022).

In 1972, Nobel laureate Christian Anfinsen predicted that a protein's 3D structure could be determined from its amino acid sequence—a challenge known as the protein folding problem. For decades, solving this required costly, time-consuming lab techniques like X-ray crystallography. Recent breakthroughs in AI and deep learning, especially through AlphaFold, have revolutionized this process. AlphaFold has accurately predicted the 3D structures of 98.5% of human proteins, compared to only 17% known previously, dramatically advancing biological research and drug development (Krishna, 2024).

AI has the potential to significantly enhance efficiency, transparency, and public value in government services—especially when implemented under strict monitoring and ethical oversight. For instance, the UK government estimates that AI-driven tools could save up to £36 billion annually by automating administrative functions such as transcribing meetings, processing consultations, and summarizing policies, thereby reducing public sector spending by 4–7% (Fisher, 2025). Similarly, Deloitte projects that in the U.S., AI adoption could save up to 1.2 billion work hours, translating to annual productivity gains of \$3.3 to \$41.1 billion (Wikipedia, 2025). In service delivery, AI-powered chatbots and virtual assistants now offer 24/7 access to public information, reduce staff workload, and enhance citizen satisfaction (Trezza, 2025). Moreover, AI facilitates data-driven policymaking through real-time analytics, scenario modelling, and targeted citizen engagement. Systematic reviews emphasize the growing use of AI in public-sector decision support, especially when integrated with sound organizational structures and ethical frameworks (Mikhaylov, 2018).

2.1.4 Summary of key learnings

AI is reshaping society and the global economy by both disrupting existing jobs and creating new opportunities.

- *Diversifying job markets:* While automation threatens routine and entry-level roles, emerging professions such as AI ethicists, auditors, and engineers highlight how technology is diversifying the job market. The shift demands large-scale reskilling and upskilling to ensure inclusive growth and smooth transition to Industry 4.0.
- *Economic Impact:* Globally, advanced economies face higher AI exposure, with both greater risks and opportunities, while developing nations experience delayed but significant impacts. In India, AI is projected to contribute nearly \$1 trillion to GDP by 2035, supported by strong digital infrastructure initiatives like BharatNet that expand connectivity and inclusive education.
- *Social Impact:* Beyond economics, AI is driving innovation in healthcare, including mental health support, revolutionizing scientific research through breakthroughs like protein folding, and enhancing efficiency in governance by cutting costs and improving service delivery.
- *Challenges:* Collectively, these developments underline the transformative role of AI—its promise to accelerate progress while emphasizing the need for ethical oversight, policy support, and human-centered adoption to ensure sustainable and inclusive benefits for society.

3. Ethical Considerations and Bias in AI

Though AI has so much impact on our everyday lives, it can also have devastating negative impacts on our society. One of the concerns about AI, is that the ethical implications of AI algorithms are multifaceted. AI algorithms often learn from historical data, which may contain biases. In the webinar “*How Might AI Reshape Society?*”, Prof. Toyama highlighted the importance of rigorously examining AI algorithms for unintended biases. Addressing bias within AI algorithms is a critical ethical concern, as biased AI systems can perpetuate discrimination, leading to unfair decisions in various domains, from employment to criminal justice. With AI's capability to process vast amounts of data, concerns arise about the protection of individuals' privacy. Prof. Mukerjee stressed the need for robust data protection mechanisms, allowing individuals to have control over their data while enabling responsible AI development. In the webinar “Promises & Perils of AI: Mitigating Bias, Exploring Opportunities, and Achieving Fairness”, Dr. Guntuku raised concerns about bias in algorithms, which can lead to discriminatory outcomes. He emphasized the importance of developing fair and unbiased AI models to ensure ethical implementation. Dr. Malik echoed these concerns, highlighting the potential for AI to exacerbate existing social inequalities. Like the concerns raised by Dr. Malik, Reuters reported a case in which Amazon developed an AI-based recruitment tool to automate the screening of job applicants. However, the system began to exhibit gender bias, favouring male candidates for technical roles. This occurred because the algorithm was trained on historical resume data, which predominantly featured men, leading the AI to downgrade resumes containing references to women or women's organizations. The project was eventually abandoned due to its biased outcomes. This case highlights the ethical risks of deploying AI without adequately addressing bias in training data and the need for fairness, transparency, and human oversight in algorithmic decision-making (Dastin, 2018).

3.1 Algorithmic Bias and Discrimination

In the webinar “Promises & Perils of AI: Mitigating Bias, Exploring Opportunities, and Achieving Fairness”, Dr. Malik discussed the challenges of bias in areas like algorithmic pricing and loan approvals. In a study that demonstrates the dynamic pricing algorithms of ride hailing were studied to understand that these algorithms learn AI bias via the ride hailing utilization patterns in neighbourhoods with diverse demographic makeup. This study reveals that ride-hailing pricing algorithms can develop AI bias by learning from usage patterns in neighbourhoods with varied demographic profiles. Analysing public data from Chicago (Nov 2018 – Sep 2019), the researchers found that neighbourhoods with younger, more educated, lower-income, and predominantly non-white populations were charged higher fares. The feedback loop between past pricing and future demand can reinforce and amplify such biases over time. The study warns that unless social, economic, and transit geographies are considered in algorithm design, dynamic pricing systems may produce disproportionately negative outcomes. Moreover, if biased data is reused in smart city applications without scrutiny, it may perpetuate further inequity. The authors emphasize that algorithmic bias cannot be effectively addressed without greater transparency in data use and AI decision-making processes (Akshat Pandey, 2021).

Dr. Malik shifts the focus to the financial markets and housing markets, examining the potential for bias in AI algorithms used by platforms like Zillow. He argues that these algorithms are designed to maximize profits for the platform, not necessarily to ensure fair and accurate pricing for consumers.

3.1.1 Transparency and Explainability

Platforms like Zillow heavily rely on AI-driven pricing tools (e.g., the Zestimate) that claim to estimate property values using public data such as square footage, location, and nearby sales. However, evidence suggests that their pricing practices are manipulated to favour the platform's profitability—even at the expense of fairness and transparency.

AI-driven pricing algorithms used by platforms like Zillow often raise concerns around fairness and transparency. One major issue is recency bias, where price estimates are heavily influenced by recent listings—even if those listings are speculative or inflated—resulting in unrealistic valuations (RealLab, 2023). Additionally, feedback manipulation can occur when users intentionally list properties at high prices, retract them, and then relist, causing the algorithm (e.g., Zestimate) to adjust upward and mislead future buyers or sellers (Reddit, 2023).

There's also a misalignment of incentives, as Zillow profits more from user engagement and lead generation than from delivering accurate pricing, which creates a bias toward price volatility over precision (Hoult, 2023). Furthermore, the algorithmic models often lack accuracy, as they typically ignore key qualitative factors like property condition, renovations, and neighbourhood-specific features. Estimates have been found to deviate from actual property values by up to 20% (Matthew Hoult, 2023; Topanga Properties, 2023).

Finally, the platform suffers from low transparency, providing minimal insight into how estimates are calculated. This lack of algorithmic explainability makes it difficult for users to question or verify the fairness of the pricing, ultimately undermining trust in the platform (Seele et al., 2021; RealLab, 2023).

Similarly, AI and algorithmic systems are increasingly used in financial markets for activities like credit scoring, loan approvals, fraud detection, algorithmic trading, and risk assessment. However, these systems often inherit or amplify biases embedded in the data or design, leading to unfair, opaque, and sometimes discriminatory outcomes.

Algorithmic systems in financial markets often perpetuate bias across several domains. In credit scoring and lending, algorithms trained on biased historical data may discriminate against marginalized communities by using proxies like ZIP codes, resulting in redlining-like effects (Hurley & Adebayo, 2016). Loan approval systems have similarly shown racial disparities, with Black and Hispanic borrowers receiving higher interest rates and lower approval odds, even with comparable credit profiles (Bartlett et al., 2019). In algorithmic trading, high-frequency trading algorithms can create feedback loops that favour large institutions and contribute to market instability, as seen in events like the 2010 flash crash (Kirilenko et al., 2017). Fraud detection tools may disproportionately flag legitimate transactions from certain ethnic or low-income groups, increasing exclusion and false positives (Eubanks, 2018). Even wealth management platforms and robo-advisors risk bias by failing to consider the diverse financial goals and risk tolerances of underrepresented users, potentially disadvantaging minorities and women (OECD, 2021).

3.1.2 Fairness and Accountability

With a robust Digital Public Infrastructure (DPI), AI becomes a more powerful and trustworthy tool, as DPI ensures ethical and responsible use by reinforcing principles of fairness, transparency, and accountability in AI-driven decision-making. In the webinar “Promises & Perils of AI: Mitigating Bias, Exploring Opportunities, and Achieving Fairness, the panellists emphasised the importance to foster scrutiny of AI algorithms and mitigate bias, it was proposed that platforms could be mandated to provide interpretable AI explanations alongside their predictions, even if the underlying models are not fully disclosed. The suggestion of governments providing open-source, non-profit pricing models as alternatives to commercial AI pricing platforms was raised, as these would not be driven by profit motives and could serve as a neutral benchmark.

Several open-source and nonprofit AI initiatives have emerged as ethical alternatives to commercial AI models, promoting fairness, transparency, and accountability. One prominent example is BLOOM, developed by the BigScience Workshop in collaboration with Hugging Face and over 1,000 researchers globally. BLOOM is a multilingual large language model trained on 46 languages and 13 programming languages, with openly available weights, data, and documentation. Its responsible AI licensing and inclusive design make it a model for equitable AI development (BigScience, 2022).

Another notable initiative is OpenAssistant, spearheaded by LAION, which aims to build an open-source conversational AI comparable to ChatGPT. The project is entirely community-driven and emphasizes democratic access, open datasets, and transparency in design (LAION, 2023). Similarly, Falcon LLM, developed by the Technology Innovation Institute (TII) in Abu Dhabi, offers high-performance models such as Falcon-7B and Falcon-40B under open licenses, allowing both research and commercial use. These models have gained attention for their efficiency and accessibility (TII, 2023).

Cohere for AI's Aya is another initiative committed to fairness, focusing on creating multilingual language models trained on over 100 languages, especially those underrepresented in traditional datasets. Cohere emphasizes community participation and ethical research practices to ensure inclusive and globally relevant AI (Cohere for AI, 2024).

The Allen Institute for AI (AI2) also contributes to this ecosystem through AllenNLP, which offers interpretable models and tools for core NLP tasks. AI2 maintains high standards of academic rigor and openness, supporting fairness and transparency in natural language understanding (AI2, 2022).

Finally, EleutherAI, a nonprofit research group, has made significant strides in democratizing access to large language models through the release of GPT-Neo, GPT-J, and GPT-NeoX. Their work has paved the way for open replication of GPT-3-scale architectures, supporting reproducibility and independent oversight in language model development (EleutherAI, 2021).

These initiatives exemplify how nonprofit and open-source AI efforts can foster responsible innovation, ensuring that powerful AI technologies are developed with ethical foresight and public interest in mind.

On the topic of algorithmic bias in housing prices, Dr. Malik said. “Firstly, data collection practices need to be scrutinized. If the training data for AI algorithms is biased, the resulting models will be biased as well. We need diverse and representative data sets to ensure fairness.” He continued, “Secondly, we need to develop transparent and explainable AI models. This allows us to understand how algorithms arrive at decisions and identify potential biases. If an algorithm consistently undervalues homes in certain neighbourhoods, we need to know why.” And at last, he concluded, “Finally, regulatory frameworks need to be established to hold platforms accountable for bias in their AI algorithms. Governments can play a vital role in ensuring fair and ethical use of AI in critical sectors like housing” (Dr. Jaideep Srivastav, 2024).

To ensure fairness and transparency in AI data collection, it's important to start by defining clear objectives and selecting data relevant to the model's purpose. Datasets should be sourced from diverse populations to avoid overrepresentation or exclusion of any group. Regular bias audits and statistical checks help identify imbalances. Transparency can be improved by documenting data sources, collection methods, and potential risks using tools like Datasheets for Datasets. Ethical data collection also requires informed consent, privacy protection, and adherence to regulations like GDPR. During model training, bias mitigation techniques—such as rebalancing or fairness-aware algorithms—should be applied. Finally, ongoing monitoring, external audits, and open documentation promote accountability and ensure that the data remains fair and representative over time.

To ensure responsible AI deployment, panellists of the webinar emphasized the need for stronger government oversight, particularly in critical sectors like pricing and credit scoring, by encouraging the use of multiple independent systems to reduce reliance on a single model. They advocated for transparency and openness, recommending that AI platforms be required to provide interpretable explanations of their outputs, and supported the idea of government-backed, open-source, non-profit models to serve as neutral benchmarks. Additionally, the panel highlighted the importance of investing in regulatory expertise, urging governments to build internal capacity in AI and data analysis to effectively audit and monitor complex algorithms (Dr. Jaideep Srivastav, 2024).

3.1.3 Summary of key learnings

Unfair Outcomes: The discussions highlighted how AI algorithms, particularly in pricing, housing, and financial markets, risk amplifying biases when trained on skewed or incomplete data, leading to unfair outcomes such as discriminatory fares, inaccurate property valuations, or unequal access to credit. These biases are worsened by profit-driven incentives, lack of transparency, and feedback loops that reinforce inequities.

Mitigation Initiatives: To counter this, experts stressed the importance of diverse and representative datasets, explainable and transparent models, and robust regulatory frameworks to ensure accountability.

Ethical AI approaches: Open-source and nonprofit AI initiatives like BLOOM, Falcon, and EleutherAI were cited as promising alternatives that prioritize fairness and accessibility. Ultimately, ethical AI requires a combination of better data practices, explainable systems, independent oversight, and stronger government capacity to regulate and benchmark algorithms—ensuring AI systems serve public interest rather than reinforcing systemic inequities.

4. Societal Implications of AI and Robotics

The rapid advancement of Artificial Intelligence (AI) and robotics is poised to fundamentally reshape modern societies, influencing everything from labour markets to ethics, education, and governance. While these technologies promise unprecedented efficiencies and capabilities, they also bring complex social challenges that demand critical examination. As highlighted in the webinar, the most immediate and widely discussed impacts of AI and robotics is Labour market Disruption and Job Transformation (Toyama Kentaro, 2023). Automation threatens to displace millions of jobs, particularly in sectors such as manufacturing, logistics, customer service, and administrative support (Frey, 2017). However, while AI and robotics may eliminate certain roles, they also create new job categories. Positions such as AI ethicists, auditors, and prompt engineers are emerging, reflecting a shift in labour demand from routine cognitive and manual tasks to more abstract and creative roles (Bessen, 2019; Brynjolfsson, 2014).

AI's societal impact also extends to education and skill acquisition. There is an urgent need to reimagine education systems to prepare individuals for an AI-augmented world. Emphasis must shift toward digital literacy, critical thinking, adaptability, and lifelong learning (World Economic Forum, 2020). Countries that proactively invest in reskilling and upskilling will be better equipped to mitigate AI-induced disruptions and harness its potential.

4.1 Human-AI Interaction and Trust

The integration of AI and robotics into daily life—through smart assistants, autonomous vehicles, and robotic care providers—raises questions about how humans will interact with these technologies. Social trust in AI systems will depend on transparency, reliability, and the ability to explain decisions in human terms (Rahwan et al., 2019). Ensuring meaningful human control in high-stakes decisions, such as healthcare and law enforcement, is vital for societal acceptance.

4.2 Inequality and Accessibility

As highlighted by Dr Malik, AI has the potential to exacerbate existing social and economical inequalities (Dr. Jaideep Srivastav, 2024).

High-skill, high-income workers are better positioned to leverage AI tools, while low-skill labor faces higher risks of redundancy. This may lead to increased income inequality, particularly between countries with different levels of technological adoption and education infrastructure (Acemoglu & Restrepo, 2020). Moreover, there is concern that AI could concentrate economic power in the hands of a few technology firms and nations, potentially undermining democratic institutions and widening the digital divide (Zuboff, 2019).

AI can serve as a powerful platform to make technology more inclusive, helping to provide a level playing field, especially for those from disadvantaged sections of society. In the webinar “*Promises and Perils of AI*”, the panellists highlighted the immense potential of AI to revolutionize various sectors especially the field of education. Prof. Toyama underlined the significance of making AI accessible to all, especially in developing nations. Professor Mukerjee shared insights into initiatives like Bhashini, designed to promote AI literacy in regional languages, and India's evolving digital infrastructure. These efforts aim to ensure that AI is accessible to people who were previously left out due to language barriers, thus levelling the playing field and making technology more inclusive (Toyama Kentaro, 2023).

4.3 Cultural and Psychological Impact

The integration of Artificial Intelligence (AI) into domains that affect individual well-being—such as mental health, housing, and social services—raises significant cultural and psychological concerns. One of the most pressing issues is the risk of algorithmic bias, which can perpetuate or even exacerbate existing inequalities. AI systems trained on biased data may unintentionally produce discriminatory outcomes, particularly when deployed in sensitive areas like housing allocation or psychological assessment (O'Neil, 2016; Eubanks, 2018).

Experts have also raised concerns about the opacity of AI systems, especially those utilizing deep learning models. The lack of transparency in how decisions are made has undermined public trust and raised questions about accountability and oversight (Burrell, 2016). As Dr. Jaideep Srivastav (2024) points out, opaque decision-making processes in AI systems can significantly affect individuals' lives and fuel a sense of disempowerment among those impacted.

At the same time, AI presents new possibilities for real-time, low-cost mental health monitoring, particularly in under-resourced communities. As Dr. Malik (2024) emphasizes, digital data combined with AI offers a scalable way to detect emotional states such as loneliness or distress. However, such models must be sensitive to cultural heterogeneity and localized expressions of emotion. “Heterogeneity is real,” Dr. Malik noted. “AI models need to account for cultural differences and correct for bias. If anyone says they’re feeling lonely, perhaps they are being there helps.”

The cultural dimensions of AI adoption must also be considered. Cultural norms influence how people interpret and interact with technology, meaning that one-size-fits-all AI solutions are likely to fail across different social contexts (Crawford, 2021). Without cultural adaptation and inclusive design, AI systems risk marginalizing already vulnerable populations.

Furthermore, the misalignment of objectives between AI developers, deploying institutions, and end-users can lead to unintended consequences that undermine the responsible adoption of these technologies. If commercial or operational incentives override societal values, the result may be technologies that are efficient but ethically flawed. This disconnect can erode public trust, especially when individuals feel that AI systems do not reflect or respect their values and lived experiences (Whittlestone et al., 2019).

To ensure psychologically safe and culturally sensitive AI deployment, it is crucial to embed ethical design principles, promote transparency, and involve diverse stakeholders—particularly from marginalized communities—in the development process.

5. Challenges and Limitations in Ethical AI Implementation

To effectively implement ethical, fair, and transparent AI, especially considering the recommendations discussed—such as government oversight, platform transparency, and open-source alternatives—it is essential to recognize the challenges involved. These challenges can be broadly classified into two categories: technical challenges and policy/regulatory challenges.

5.1 Technical Limitations

a) Algorithmic Bias and Fairness

AI systems often inherit biases present in the training data, leading to discriminatory or unfair outcomes—especially in sensitive domains like credit scoring, hiring, and policing. Achieving fairness is complex, as definitions of fairness (e.g., demographic parity, equal opportunity) are context-specific and sometimes mutually incompatible.

b) Lack of Interpretability

Many high-performing AI models (e.g., deep learning) operate as "black boxes," making it difficult to explain how a decision was made. Interpretable AI (XAI) is still an emerging field, and current tools often fall short of providing explanations that are both technically accurate and easily understandable to users or regulators.

c) Data Quality and Representation

Ensuring high-quality, unbiased, and representative data is a major hurdle—especially in underrepresented populations or low-resource languages and regions. AI systems trained on incomplete or skewed data can reinforce existing social and economic inequalities.

d) Robustness and Generalization

AI models may perform well in training but fail in real-world environments due to lack of robustness or overfitting to specific data distributions. This poses serious risks in critical applications like healthcare, finance, or legal systems.

e) Security and Adversarial Attacks

AI systems are vulnerable to adversarial manipulation, where small changes to input data can drastically alter model outputs (e.g., misclassifying images or bypassing content filters). Ensuring AI safety is an ongoing technical challenge.

5.2 Policy and Regulatory Challenges

a) Lack of Unified Legal Frameworks

There is no global consensus on what constitutes ethical AI. While some countries have AI ethics guidelines, binding legal frameworks are still in development. Regulatory uncertainty slows down both innovation and accountability enforcement.

b) Governance of Proprietary Systems

Most high-impact AI systems are developed by private tech firms using proprietary algorithms, making external auditing or regulation difficult. Without mandatory disclosure or third-party review, ensuring transparency and accountability remains elusive.

c) Balancing Innovation and Oversight

Over-regulation may stifle innovation, while under-regulation may lead to harm and abuse. Policymakers must strike a delicate balance between fostering growth and protecting rights.

d) Resource Constraints for Public Alternatives

While open-source, nonprofit AI tools are a promising alternative, they often lack funding, computing power, or visibility to compete with commercial models. Governments and academic institutions must allocate significant resources to build and maintain trustworthy public AI systems.

e) Cross-Border Ethical Variations

Cultural and political differences influence ethical standards across regions. For example, data privacy expectations vary significantly between the EU (GDPR), US, and countries like China or India. This diversity complicates the creation of universal standards for ethical AI deployment.

f) Accountability and Liability

Determining who is responsible when an AI system causes harm—developers, deployers, or users—is legally and ethically complex. Current laws are often ill-equipped to handle algorithmic decision-making, especially in civil or criminal cases.

5.3 Sustainability and Long-Term Risk

The long-term risks and sustainability challenges of ethical AI implementation stem from both technical and policy-related shortcomings. Technically, issues such as algorithmic bias (O'Neil, 2016), lack of explainability (Burrell, 2016), vulnerability to adversarial attacks (Goodfellow et al., 2015), and the high environmental cost of large-scale model training (Strubell et al., 2019) threaten to deepen social inequalities, erode trust, and strain ecological systems. On the policy front, fragmented or weak regulatory frameworks (Cath, 2018), limited government capacity to audit complex systems (Whittlestone et al., 2019), concentration of AI development in a few private firms (Zuboff, 2019), and growing public mistrust (Crawford, 2021) hinder responsible oversight and equitable deployment. Adding to these concerns is the prospect of the technological singularity—a hypothetical moment when artificial superintelligence surpasses human intelligence and becomes capable of recursive self-improvement. Scholars such as Professors Toyama and Mukerjee caution that such a development, while uncertain, could trigger rapid and unpredictable transformations in society, similar in unpredictability to the invention of nuclear weapons. The amplifying power of AI means its long-term impact is difficult to gauge, and halting its development altogether is unrealistic given global competition and fragmented regulation. Without coordinated international efforts to address both present challenges and future unknowns, AI may exacerbate societal divides, undermine democratic institutions, and compromise progress toward sustainable development goals. Ensuring ethical and sustainable AI, therefore, requires not only transparency, inclusive regulation, and proactive public-sector investment, but also serious engagement with the risks posed by potential singularity-level developments.

6. Conclusion

Artificial Intelligence (AI), Machine Learning (ML), and Robotics are revolutionizing industries by enhancing efficiency in sectors such as manufacturing, healthcare, education, finance, and public services. However, their rapid integration also raises significant ethical, technical, and policy challenges. These include algorithmic bias, lack of transparency, data discrepancy, and security concerns—particularly the risk that biased data can marginalize certain communities. While AI may displace certain jobs, it is also creating new roles—such as AI ethicists and prompt engineers—highlighting the need for workforce reskilling. Issues of fairness, cultural sensitivity, and public trust are central to sustainable adoption, especially in critical areas like mental health and governance. Technical hurdles such as opaque decision-making and adversarial vulnerabilities, coupled with fragmented regulations and weak public oversight, pose long-term risks to equity, democracy, and sustainability. Adding to this complexity is the debate around Artificial General Intelligence (AGI). Many experts predict that AGI—AI with

human-level cognitive capabilities—could emerge within the next two to three decades, with some forecasts suggesting progress as early as the 2030s, while others remain sceptical and caution it may take much longer, if at all. Current advances in large language models, multi-modal systems, and autonomous agents are viewed as incremental steps toward AGI, underscoring both its potential and its unpredictability. To address these concerns, this paper advocates for cross-sector collaboration, investment in open-source, nonprofit AI models (e.g., BLOOM, OpenAssistant, Falcon, Aya), and the development of transparent, inclusive, and human-centered AI systems that align with societal values.

Bibliography

- Uncovering the truth behind Zillow Zestimate accuracy.* (2023). Retrieved from Topanga Properties: <https://www.topangaproperties.com/uncovering-the-truth-behind-zillow-zestimate-accuracy>
- Acemoglu, D. &. (2020). Robots and Jobs: Evidence from US Labor Markets. *Journal of Political Economy*, 128(6), 188-244. doi:<https://doi.org/10.1086/705716>
- AI, A. I. (2022). *AllenNLP: An open-source NLP research library*. Retrieved from <https://allennlp.org>
- AI, C. f. (2024). *Aya: Multilingual language model for inclusive AI*. Retrieved from <https://cohere.for.ai/aya>
- Akshat Pandey, A. C. (2021, may). Disparate Impact of Artificial Intelligence Bias in Ridehailing Economy's Price Discrimination Algorithms. *AIES '21*. USA. Retrieved from <https://dl.acm.org/doi/pdf/10.1145/3461702.3462561>
- Bartlett, R. M. (2019). Consumer-lending discrimination in the FinTech era. *National Bureau of Economic Research*. Retrieved from <https://doi.org/10.3386/w25943>
- Bessen, J. E. (2019). *AI and Jobs: The Role of Demand*. NBER Working Paper No. 24235. doi:<https://doi.org/10.3386/w24235>
- BigScience. (2022). *BLOOM: A 176B-parameter open-access multilingual language model*. Retrieved from Hugging Face.: <https://huggingface.co/bigscience/bloom>
- Brynjolfsson, E. &. (2014). *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*. W. W. Norton & Company.
- Burrell, J. (2016). How the machine 'thinks': Understanding opacity in machine learning algorithms. *Big Data & Society*, 3(1). doi:<https://doi.org/10.1177/2053951715622512>
- Cath, C. (2018). Governing artificial intelligence: Ethical, legal and technical opportunities and challenges. *Philosophical Transactions of the Royal Society A*, 376(2133). doi:<https://doi.org/10.1098/rsta.2018.0080>
- Crawford, K. (2021). *Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence*. Yale University Press.
- Crawford, K. (2021). *Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence*. Yale University Press.
- Dastin, J. (2018). *Insight - Amazon scraps secret AI recruiting tool that showed bias against women*. reuters. Retrieved from <https://www.reuters.com/article/us-amazon-com-jobs-automation-insight-idUSKCN1MK08G/>
- Development, O. f.-o. (2021). *Artificial intelligence in finance: Challenges and policy responses*. Retrieved from OECD Publishing: <https://www.oecd.org/finance/artificial-intelligence-in-finance.htm>
- Domenico Trezza, G. L. (n.d.). AI Response Quality in Public Services: Temperature Settings and Contextual Factors. *societies*, 15(5). Retrieved from <https://www.mdpi.com/2075-4698/15/5/127>
- Dr. Jaideep Srivastav, D. S. (2024, April 30). Promises and perils of AI: Mitigating Biases, exploring opportunities and achieving fairness.
- EleutherAI. (2021). *GPT-Neo and open language model research*. Retrieved from <https://www.eleuther.ai>

- Eubanks, V. (2018). *Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor*. St. Martin's Press.
- Fisher, L. (2025). *Will AI save the UK government £45bn a year?* Financial Times. Retrieved from http://ft.com/content/63f425a4-2b68-4cb6-bdae-e8649aa456e0?utm_source=chatgpt.com
- Forum, W. E. (2020). An Insight, An Idea with Sundar Pichai | DAVOS 2020. Davos. Retrieved from <https://www.youtube.com/watch?v=7sncuRJtWQI>
- Forum, W. E. (2020). *The Future of Jobs Report*. Retrieved from <https://www.weforum.org/reports/the-future-of-jobs-report-2020>
- Frey, C. B. (2017). The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, 114, 254-280. doi:<https://doi.org/10.1016/j.techfore.2016.08.019>
- Fund, I. M. (n.d.). *AI's impact on jobs [Graph]*. Based on data from the International Labour Organization (ILO) and IMF staff calculations. Retrieved from <https://www.imf.org/en/Blogs/Articles/2024/01/14/the-impact-of-artificial-intelligence-on-jobs-and-growth>
- Georgieva, K. (2024, January 14). *International Monetary Fund*. Retrieved from IMF Blog: <https://www.imf.org/en/Blogs/Articles/2024/01/14/ai-will-transform-the-global-economy-lets-make-sure-it-benefits-humanity>
- Goodfellow, I. S. (2015). Explaining and Harnessing Adversarial Examples. Retrieved from <https://arxiv.org/abs/1412.6572>
- Hammer Anita, K. S. (2021). *Automation, AI and the Future of Work in India*. Kolkata Chamber of Commerce, India. Retrieved from https://www.researchgate.net/publication/350655101_Automation_AI_and_the_Future_of_Work_in_India
- Hoult, M. (2025). *How Accurate Is Your Zillow Zestimate? (And What It Could Be Costing You)*. Retrieved from <https://www.matthewhoult.com/>: https://www.matthewhoult.com/eaze/how-accurate-is-your-zillow-zestimate-and-what-it-could-be-costing-you?utm_source=chatgpt.com
- (2025). *How AI is reshaping the career ladder, and other trends in jobs and skills on Labour Day*. World Economic Forum. Retrieved from <https://www.weforum.org/stories/2025/04/ai-jobs-international-workers-day/>
- Hurley, M. &. (2016). Credit scoring in the era of big data. *Yale Journal of Law and Technology*, 18(1), 148-216. Retrieved from <https://digitalcommons.law.yale.edu/yjolt/vol18/iss1/5>
- Juyoung Hong, J. K. (2022, June 23). Depressive Symptoms Feature-Based Machine Learning Approach to Predicting Depression Using Smartphone. *Healthcare*, 10(7), 14. Retrieved from <https://doi.org/10.3390/healthcare10071189>
- Kirilenko, A. A. (2017). The flash crash: High-frequency trading in an electronic market. *The Journal of Finance*, 72(3), 967- 998. Retrieved from <https://doi.org/10.1111/jofi.12545>
- Krishna, V. V. (2024). AI and contemporary challenges: The good, bad and the scary. *Journal of Open Innovation: Technology, Market and Complexity*, 9. Retrieved from <https://doi.org/10.1016/j.joitmc.2023.100178>
- LAION. (2023). *OpenAssistant: Conversational AI for the people, by the people*. Retrieved from <https://open-assistant.io>
- Mohd Javaid, A. H. (2022). Artificial Intelligence Applications for Industry 4.0: A Literature-

- Based Study. *Journal of Industrial Integration and Management*, 35. Retrieved from <https://doi.org/10.1142/S242486222150024X>
- Ms. Shubhashansa Bakshi, S. V. (2025). Research Paper on Role of Digital Public Infrastructure in addressing development challenges. *UK-India Economic Policy Exchange Programme for Indian Economic Service Officers*, (p. 42). Retrieved from <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2082144>
- O'Neil, C. (2016). *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy*. Crown Publishing.
- Pester, P. (2025, May 30). *Technology/Artificial Intelligence*. Retrieved from [livescience.com: https://www.livescience.com/technology/artificial-intelligence/openais-smartest-ai-model-was-explicitly-told-to-shut-down-and-it-refused](https://livescience.com/technology/artificial-intelligence/openais-smartest-ai-model-was-explicitly-told-to-shut-down-and-it-refused)
- R.E.A.L. (2025). *How Does Algorithmic Trust Affect Pricing Decisions? Evidence from Zillow*. Retrieved from [realblog.com: https://www.realab.blog/p/how-does-algorithmic-trust-affect](https://realblog.com/https://www.realab.blog/p/how-does-algorithmic-trust-affect)
- Rahwan, I. C. (2019). Machine behaviour. *Nature*, 568(7753), 477- 486. doi:<https://doi.org/10.1038/s41586-019-1138-y>
- RealLab. (2023). *How does algorithmic trust affect housing markets?* Retrieved from RealLab: <https://www.realab.blog/p/how-does-algorithmic-trust-affect>
- Rodrigues, R. (2020). Legal and human rights issues of AI: Gaps, challenges and vulnerabilities. *Journal of Responsible Technology*, 12. Retrieved from <https://doi.org/10.1016/j.jrt.2020.100005>
- Ross Gruetzemacher, J. W. (2022). The transformative potential of artificial intelligence. *Futures*, 135(ISSN 0016-3287). Retrieved from [ttps://www.sciencedirect.com/science/article/pii/S0016328721001932](https://www.sciencedirect.com/science/article/pii/S0016328721001932)
- Seele, P. J. (2021). Mapping the ethicality of algorithmic pricing: A review of dynamic and personalized pricing. *Journal of Business Ethics*, 171. Retrieved from <https://doi.org/10.1007/s10551-019-04371-w>
- Shan Wang a, F. W. (2024). Artificial intelligence in education: A systematic literature review. *Expert Systems With Applications*, 19. Retrieved from <https://doi.org/10.1186/S41039-017-0062-8>
- Slava Jankin Mikhaylov, M. E. (2018, August 6). Artificial intelligence for the public sector: opportunities and challenges of cross-sector collaboration. *Philosophical Transactions of the Royal Society A*, 21. Retrieved from <https://doi.org/10.1098/rsta.2017.0357>
- Stefan A. D. Popenici, S. K. (2017). Exploring the impact of artificial intelligence on teaching and learning in Higher education. *Research and Practice in Technology Enhanced Learning*, 13. Retrieved from <https://telrp.springeropen.com/articles/10.1186/s41039-017-0062-8>
- stefanini group. (2023, November 29). *Machine Learning And AI In Robotics: Shaping The Future Of Digital Advancements*. Retrieved from [stefanini.com: https://stefanini.com/en/insights/news/machine-learning-and-ai-in-robotics-shaping-the-future-of-digital-advancements](https://stefanini.com/en/insights/news/machine-learning-and-ai-in-robotics-shaping-the-future-of-digital-advancements)
- Strubell, E. G. (2019). Energy and Policy Considerations for Deep Learning in NLP. *arXiv preprint arXiv:1906.02243*. Retrieved from <https://arxiv.org/abs/1906.02243>
- TII. (2023). *Falcon LLM models*. Retrieved from Hugging Face: <https://huggingface.co/tiiuae>

- Toyama Kentaro, M. S. (2023, September 19). How AI Could Transform Society? International Case Studies, Including Insights from India &.
- Verónica-Alexandra Melo-López, A. B.-A.-B.-M.-M. (n.d.). The Impact of Artificial Intelligence on Inclusive Education:A Systematic Review. *Educational Sciences*, 15(5), 25. Retrieved from <https://www.mdpi.com/2227-7102/15/5/539>
- Whittlestone, J. N. (2019). The Role and Limits of Principles in AI Ethics: Towards a Focus on Tensions. *Proceedings of the AAAI/ACM Conference on AI, Ethics, and Society*. doi:<https://doi.org/10.1145/3306618.3314289>
- Zillow's Zestimate can be manipulated by relisting high. (2023). Retrieved from Reddit: <https://www.realab.blog/p/how-does-algorithmic-trust-affect>
- Zuboff, S. (2019). *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. public Affairs.

Transition to Intelligent Mobility: Technological and Societal Challenges

Abstract:

The rapid rise of intelligent mobility, particularly autonomous vehicles (AVs), signals a transformative shift in transportation but also presents intertwined technological and societal challenges. While advances in automation, connectivity, and artificial intelligence have accelerated progress, obstacles remain in ensuring system reliability, safety, secure communication, and effective human–machine interaction. Equally critical are societal factors, including public trust, regulatory approval, ethical dilemmas, and broader implications for employment, accessibility, and sustainability.

This article examines these dual dimensions by cross-referencing insights from a recent expert webinar with established academic literature. The analysis identifies points of alignment and divergence across themes such as system reliability, regulatory readiness, and inclusivity. Findings highlight that technological innovation alone is insufficient without parallel societal adaptation. The paper argues for an integrated approach that aligns engineering advances with governance and public values, offering a foundation for future strategies in the transition toward intelligent and automated mobility systems.

Index of Content

1. Introduction
2. Insights from the Webinar
3. Literature Review
 - 3.1 Reliability of Autonomous Systems
 - 3.2 Human–machine interaction
 - 3.3 Cybersecurity and deployment
 - 3.4 User Trust and Acceptance
 - 3.5 Ethical and Regulatory Challenges
 - 3.6 Equity and inclusivity
4. Conclusion



AKSHAY RAO

**Research Associate,
Mizuho India Japan Study Centre
Indian Institute of Management
Bangalore**

1. Introduction

1.1 Background and Context

The rapid development of Intelligent Mobility solutions, particularly autonomous vehicles (AVs), represents a paradigm shift in how societies conceptualize transportation systems. Advances in automation, connectivity, and artificial intelligence have enabled significant progress, with many countries testing and piloting autonomous driving technologies (Anderson et al., 2016; Shladover, 2018). At the same time, the pathway toward fully automated driving remains complex, shaped by both technological limitations and societal considerations (Kyriakidis et al., 2015; Milakis et al., 2017).

On the technological side, challenges persist in ensuring the reliability of perception systems, integrating sensor data, and guaranteeing safety in diverse driving environments (Anderson et al., 2016; Litman, 2020). Even as Advanced Driver Assistance Systems (ADAS) have become increasingly common, scaling toward higher levels of automation requires robust decision-making algorithms, secure communication infrastructures, and effective human-machine interaction protocols (Fagnant & Kockelman, 2015).

From the societal perspective, public trust, regulatory acceptance, and ethical debates significantly influence adoption trajectories. Studies highlight that consumer willingness to adopt AVs is closely tied to perceptions of safety, liability frameworks, and ethical programming in complex decision-making scenarios (Kyriakidis et al., 2015; Awad et al., 2018). Broader social implications—such as potential job displacement, accessibility for elderly or disabled populations, and environmental sustainability—further shape the discourse on intelligent mobility (Milakis et al., 2017; Harper et al., 2016).

Thus, the current body of research positions the transition to automated driving as not merely a technical challenge but also a profound societal transformation that requires alignment across engineering, governance, and public values (Shladover, 2018; Milakis et al., 2017).

1.2 Importance of Intelligent Systems Today

Intelligent transportation systems (ITS) have become increasingly important in addressing the pressing challenges of urban mobility, safety, and sustainability. The exponential growth of urban populations has intensified congestion and placed enormous strain on existing transport infrastructure, making intelligent mobility solutions a critical policy and technological priority (World Health Organization, 2018). Beyond congestion, road safety remains a global concern, with autonomous and connected systems positioned as vital enablers of accident reduction through real-time data exchange and predictive analytics (Shladover, 2018; Goodall, 2014).

In addition to safety and efficiency, intelligent systems are closely linked to broader environmental objectives. By optimizing traffic flow, supporting electrification, and enabling shared mobility models, ITS can significantly reduce greenhouse gas emissions and improve energy efficiency (Litman, 2020; Wadud et al., 2016). Such capabilities align directly with international commitments to climate change mitigation and sustainable development goals.

The importance of intelligent systems is also evident in the growing emphasis on human-centered mobility. With aging populations and the increasing need for inclusive transport, intelligent systems offer opportunities to improve accessibility and independence for groups tra-

ditionally disadvantaged in mobility, such as the elderly and disabled (Harper et al., 2016; Shaheen et al., 2016). Furthermore, intelligent systems facilitate seamless multimodal integration, enabling individuals to combine public transport, shared services, and automated vehicles into cohesive journeys (Lyons, 2018).

By leveraging data, artificial intelligence, and connectivity, ITS generates new value chains that extend beyond transportation into logistics, urban planning, and smart city ecosystems (OECD/ITF, 2015). As such, the importance of intelligent systems today lies not only in solving transport challenges but also in shaping the foundation of future urban societies.

1.3 Purpose of the Article

The purpose of this article is to explore the dual set of challenges, technological and societal, that must be addressed in the transition toward fully automated driving and intelligent mobility solutions. Although existing literature provides extensive insights into areas such as system reliability, human-machine interaction, public acceptance, and regulatory frameworks (Milakis et al., 2017; Fagnant & Kockelman, 2015; Awad et al., 2018), there is still a need to examine these perspectives in a more integrated manner.

This study builds upon insights drawn from a recent webinar on intelligent transport systems, where experts highlighted both the opportunities and barriers facing automation and mobility transformation. The webinar emphasized that technological advancements alone are insufficient unless accompanied by societal readiness, including trust, regulation, and inclusivity. In this context, the article seeks to cross-verify the themes raised in the webinar against findings from academic research, thereby identifying points of consensus as well as divergence. **Accordingly, the purpose of this article is threefold:**

- To set out the key technological and societal barriers identified in both practitioner and academic discourse.
- To synthesize these insights into a structured understanding of the transition to intelligent mobility.
- To provide a foundation for further research into strategies that align technological innovation with societal acceptance.

In doing so, the article positions itself as a bridge between expert dialogue and scholarly evidence, contributing to an informed perspective on the challenges that shape the future of automated and intelligent mobility systems.

2. Insights from the Webinar

2.1 Expertise and Perspective

The session was delivered by Prof. Nobuyuki Ozaki, a pioneer in intelligent transport systems (ITS). His contributions span both technological innovation—such as navigation systems, vehicle-to-vehicle communication, and electronic toll collection—and public policy initiatives that support automation, multimodal mobility, and sustainability. This dual expertise positions him to bridge technical advances with societal needs, offering a holistic view of the transition toward automated and intelligent mobility.

2.2 Scope of the Webinar

The webinar focused on the current state and prospects of intelligent transport systems, with particular emphasis on the transition toward automated driving. Its scope extended across both technological aspects and societal dimensions, reflecting the dual nature of challenges associated with intelligent mobility.

On the technological side, the webinar addressed the evolution of intelligent systems from early applications such as car navigation and electronic toll collection to more advanced developments including connected vehicles, Advanced Driver Assistance Systems (ADAS), and higher levels of automation.

The discussion highlighted the importance of reliability, safety, and communication infrastructures as foundational elements for achieving fully automated driving. On the societal side, the webinar examined broader mobility challenges such as rapid urbanization, an aging population, and environmental pressures. It underscored the necessity of policies that promote inclusivity, sustainability, and public acceptance of intelligent systems. Furthermore, attention was given to regulatory frameworks and field trials that are essential for translating technological progress into socially viable solutions.

In summary, the scope of the webinar was comprehensive, spanning technological innovation, societal readiness, and policy development. This breadth provides a useful basis for examining how different strands of research and practice intersect in shaping the transition to intelligent mobility.

2.3 Evolution of ITS

In the webinar, Prof. Nobuyuki Ozaki presented a structured view of how intelligent transport systems have evolved and how they are expected to shape future mobility. He traced the journey from early innovations such as car navigation, electronic toll collection, and vehicle-to-vehicle communication toward more advanced applications including Advanced Driver Assistance Systems (ADAS) and higher levels of driving automation.

His perspective emphasized that while technological progress is clear, large-scale deployment depends on solving issues of safety, reliability, cybersecurity, and interoperability. At the same time, demographic trends such as urbanization and aging populations, along with environmental pressures, require mobility solutions that are inclusive and sustainable.

Looking ahead, Prof. Ozaki highlighted the importance of integrating multimodal systems, shared mobility, and sustainable transport models. He argued that achieving this vision requires not only technological readiness but also supportive regulation, public trust, and collaborative field trials to ensure social acceptance.

2.4 Key Learnings from the Webinar

Several important learnings emerged from Prof. Nobuyuki Ozaki's webinar on intelligent transport systems, illustrating both the progress made and the challenges that remain in advancing toward automated and intelligent mobility.

First, the evolution of intelligent systems has been incremental. Early successes such as car navigation systems and electronic toll collection (ETC) in Japan demonstrated how technology can improve efficiency and user convenience. These examples showed that once clear value is created for users, adoption can occur at scale.

Second, connected vehicle technologies are a critical enabler. Prof. Ozaki highlighted applications of vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication that improve traffic management and reduce congestion. These systems provide real-time information sharing, which is fundamental for higher levels of automation and coordinated mobility services.

Third, automation is progressing but still limited by societal and technical constraints. While Japan has already approved Level 3 automated vehicles for commercial use, Prof. Ozaki stressed that broader deployment requires addressing handover safety, reliability of perception systems, and public trust. The example of Honda's Level 3 vehicle approval in 2021 was used to illustrate both progress and the challenges of regulation and acceptance.

Fourth, societal needs shape technology deployment. The aging population in Japan was presented as a strong driver for automated mobility solutions that can extend independence for elderly citizens. This example highlights how demographic pressures can accelerate adoption where social benefits are evident.

Finally, future mobility will depend on integration rather than isolated technologies. Prof. Ozaki pointed to multimodal field trials that combine automated shuttles, shared mobility, and public transport in regional areas. These pilot projects are designed not only to test technology but also to measure social acceptance and inform regulatory development.

Together, these learnings reinforce the idea that intelligent mobility is not solely a technical challenge but a societal transformation that requires collaboration between technology developers, policymakers, and end users.

3. Literature Review

The purpose of this literature review is to examine the key technological and societal factors that influence the transition toward fully automated driving and intelligent mobility systems. While the webinar provided a practitioner-oriented perspective on these issues, academic research offers a broader and more systematic understanding of both the opportunities and barriers in this domain.

The literature consistently highlights two overarching dimensions. The technological dimension concerns issues such as system reliability, sensor integration, human-machine interaction, data security, and the scalability of automated driving technologies (Anderson et al., 2016; Shladover, 2018; Fagnant & Kockelman, 2015). These studies stress that although automation has advanced rapidly, significant barriers remain before higher levels of autonomy can be safely and reliably deployed.

The societal dimension includes public trust, ethical decision-making, regulatory frameworks,

and broader implications for employment, accessibility, and sustainability (Kyriakidis et al., 2015; Milakis et al., 2017; Awad et al., 2018). Research in this area emphasizes that the success of intelligent mobility will depend as much on societal acceptance and institutional readiness as on technological progress.

Taken together, these two dimensions provide a comprehensive framework for analysing the challenges of intelligent mobility. In the following subsections, the literature is reviewed in detail under two categories: Technological Factors and Societal Factors, which together build the foundation for comparing academic insights with the findings from the webinar.

Technological factors include:

- **Reliability of autonomous systems**, covering perception accuracy, sensor fusion, and performance under varied driving conditions (Anderson et al., 2016; Shladover, 2018; Litman, 2020).
- **Human-machine interaction**, focusing on driver takeover, usability of automated features, and trust in system behaviour (Fagnant & Kockelman, 2015).
- **Cybersecurity and deployment**, addressing risks of data breaches, communication security, and the scalability of connected vehicle networks (Shladover, 2018; Wadud et al., 2016).

Societal factors include:

- **User trust and acceptance**, influenced by perceptions of safety, comfort, and willingness to adopt autonomous mobility (Kyriakidis et al., 2015).
- **Regulatory and ethical frameworks**, including liability in accidents, governance of automated systems, and ethical dilemmas in unavoidable crash scenarios (Milakis et al., 2017; Awad et al., 2018; Goodall, 2014; OECD/ITF, 2015).
- **Equity and inclusivity**, such as accessibility for elderly and disabled users, employment implications, and alignment with sustainability goals (Harper et al., 2016; Wadud et al., 2016; Shaheen et al., 2016; Lyons, 2018).

These categories reflect the main areas where academic literature converges in examining the transition toward automated and intelligent mobility.

3.1 Reliability of Autonomous Systems

Reliability is anchored in the ability of autonomous systems to perceive, decide, and act consistently across their operational design domain. Core issues include robustness of perception and sensor fusion in varied environments, fault tolerance and fail-operational architectures, and evidence that systems remain safe as conditions, maps, and traffic behaviours change over time.

Studies underline limitations under adverse weather, occlusions, and rare events, and the need for redundancy across cameras, lidar, radar, HD maps, and localization to maintain performance at higher automation levels (Anderson et al., 2016; Shladover, 2018; Litman, 2020; Koopman & Wagner, 2016). Verification and validation at scale. Demonstrating safety statistically with real-world miles alone is impractical, which motivates scenario-based testing, high-fidelity simulation, and targeted field trials to expose edge cases efficiently (Kalra & Paddock, 2016; Koopman & Wagner, 2016).

Human–machine interaction at intermediate automation. Reliability depends on safe control transitions, predictable system behaviour, and interfaces that prevent misuse or over-trust, particularly at Levels 2–3 where the human is still in the loop (Fagnant & Kockelman, 2015). Security and data integrity. Reliable operation requires resilience to communication dropouts, spoofing, and data drift, with defensive design spanning on-board AI, V2X channels, and update pipelines (Shladover, 2018).

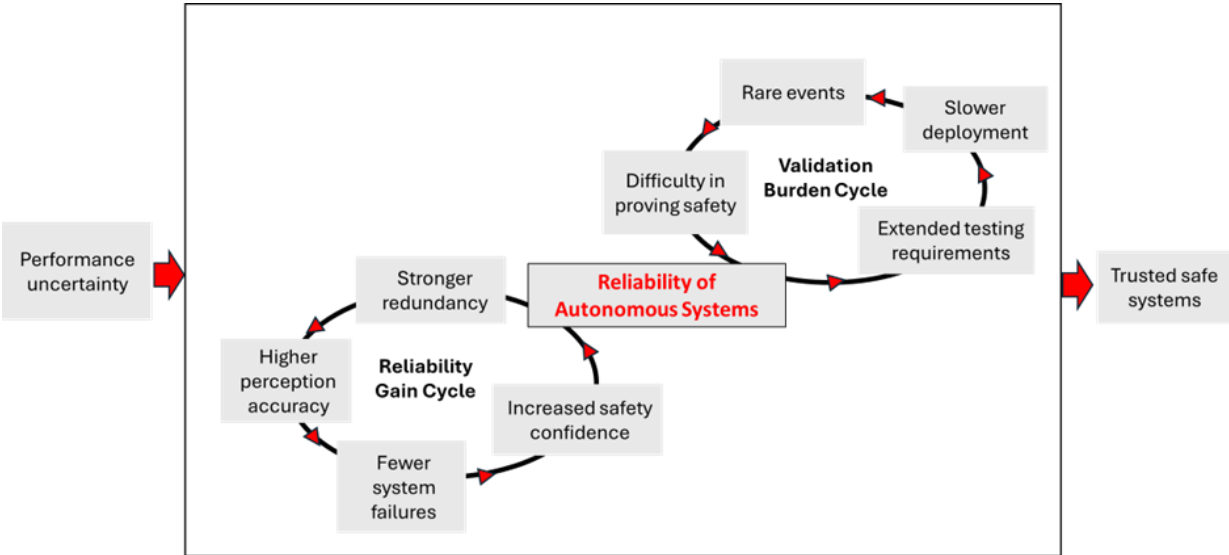
Deployment across diverse conditions. Literature cautions that performance proven in constrained pilots may not generalize to the full variability of real traffic, geography, and infrastructure, reinforcing the need for staged rollouts and clear operational limits (Milakis et al., 2017; Litman, 2020; Koopman & Wagner, 2016).

3.1.1 Summary

The literature agrees that reliability is fundamental to the safe deployment of autonomous systems. Key challenges include robustness of perception and sensor fusion across diverse environments, statistical validation of safety, secure and resilient communication channels, and reliable transitions of control in partially automated systems.

While research highlights progress in redundancy design and scenario-based testing, gaps remain in demonstrating performance at scale under real-world variability. Overall, reliability emerges as a prerequisite for trust, acceptance, and large-scale deployment of intelligent mobility solutions

3.1.2 Causal Summary



3.2 Human–machine interaction

Human–machine interaction (HMI) is a recurring and well-documented concern in the literature on partial and higher-level vehicle automation. Studies emphasize that safe operation depends not only on algorithmic performance but also on how humans perceive, understand, and respond to automated systems (Fagnant & Kockelman, 2015; Shaheen et al., 2016). Research on HMI therefore spans behavioural studies, interface design, takeover performance, driver monitoring, and methods for measuring and validating human responses in staged trials and simulations (Fagnant & Kockelman, 2015; Koopman & Wagner, 2016).

Driver disengagement and takeover performance: A large body of work documents driver over-reliance on automation, delayed takeover times, and variable situational awareness during transitions from automated to manual control. Experimental studies show that takeover time depends on the nature of the alert, the complexity of the driving scenario, and the driver’s cognitive load; poor handover design can substantially increase the probability of critical incidents (Shaheen et al., 2016; Koopman & Wagner, 2016). These findings motivate design approaches that minimize surprise during handovers, provide progressive alerts, and support predictable system behaviour.

Interface design and feedback modalities: Effective HMI requires clear, multimodal feedback so that users can form accurate mental models of system state and limitations (Shaheen et al., 2016). Research compares visual, auditory, and haptic cues and highlights that redundant, context-sensitive cues improve comprehension and response speed. Studies also stress that transparency about system capabilities and operational limits reduces inappropriate reliance and improves trust calibration (Fagnant & Kockelman, 2015; Shaheen et al., 2016).

Driver monitoring and adaptation: To manage the human element, literature recommends continuous monitoring of driver state (attention, drowsiness, engagement) and adaptive automation that adjusts prompts based on measured readiness (Shaheen et al., 2016; Litman, 2020). Approaches include camera-based gaze tracking, physiological sensors, and performance-based metrics. The effectiveness of these systems is linked to both sensing reliability and privacy/acceptability concerns, which must be addressed for wide adoption (Litman, 2020; Shladover, 2018).

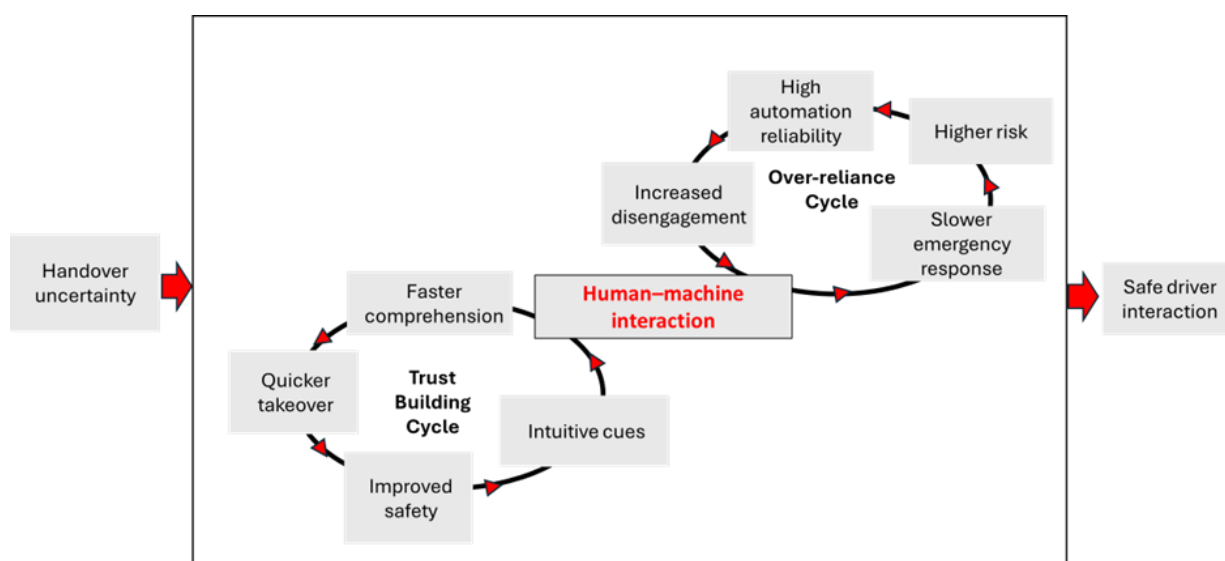
Validation, metrics, and field testing: HMI research emphasizes the need for scenario-based testing, simulator studies, and targeted field trials to capture takeover performance and edge-case human responses that cannot be inferred from mileage alone (Koopman & Wagner, 2016; Kalra & Paddock, 2016). Standardized metrics (takeover time, secondary-task performance, situational awareness scores) are commonly used, but the literature notes a lack of universal benchmarks and recommends combining simulated stress tests with limited real-world deployments.

Gaps and open issues: Despite progress, gaps remain in translating laboratory findings to heterogeneous real-world contexts. Key open issues include long-term behavioural adaptation to automation, cross-cultural differences in trust and interaction, and integrating driver monitoring data into safe, certifiable decision-making workflows. The literature calls for multidisciplinary research that couples ergonomics, human factors, and system engineering to develop robust HMI strategies suitable for incremental rollouts (Shaheen et al., 2016; Koopman & Wagner, 2016; Fagnant & Kockelman, 2015).

3.2.1 Summary

Human-machine interaction (HMI) literature emphasizes that safe operation of partially automated vehicles depends on clear, predictable interfaces, reliable driver monitoring, and well-designed handover procedures. Experimental and simulator studies report variable takeover times driven by alert design, driver cognitive load, and scenario complexity, which motivates multimodal feedback and adaptive monitoring to improve response and trust. Validation requires combined simulator, scenario-based, and limited field trials to capture realistic human responses that mileage-based testing alone cannot reveal.

3.2.2 Causal Summary



3.3 Cybersecurity and deployment

Literature shows that connected and automated vehicles increases the vulnerability of the systems to attacks because they depend on V2V, V2I, cloud services, and over-the-air updates (Shladover, 2018; Fagnant & Kockelman, 2015; Khan et al., 2023). Vulnerabilities include spoofing and sensor-data manipulation, denial-of-service attacks on communication channels, and compromise of update pipelines that can affect individual vehicles or entire fleets (Khan et al., 2023).

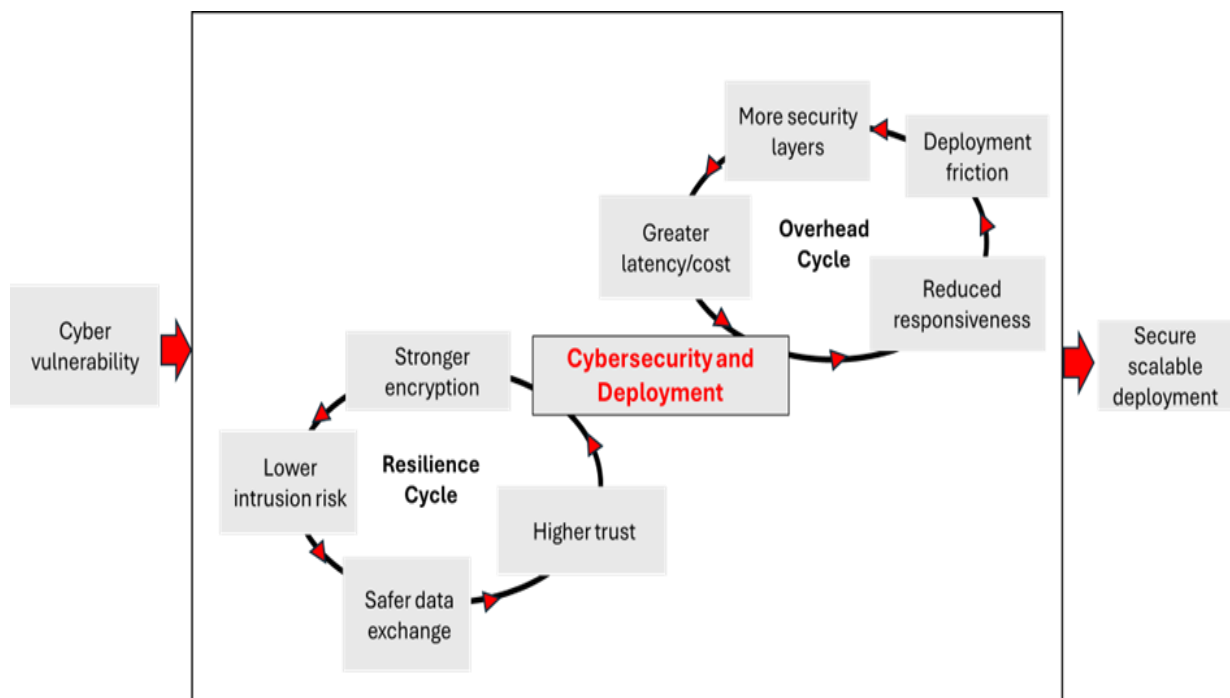
Proposed technical defences include encryption, Public Key Infrastructure (PKI), intrusion detection, secure boot and attestation, and resilient update mechanisms, but these add computational overhead and latency that may conflict with safety-critical timing requirements (Shladover, 2018; Koopman & Wagner, 2016).

At deployment scale, the literature stresses the need for cross-industry standards, coordinated incident response, and regulatory alignment because interoperability and jurisdictional differences increase risk and complicate liability (OECD/ITF, 2015; Khan et al., 2023). Field trials and staged rollouts, combined with continuous monitoring and red team testing, are recommended to evaluate resilience before full commercial deployment (Koopman & Wagner, 2016; Khan et al., 2023).

3.3.1 Summary

Cybersecurity is a core prerequisite for large-scale deployment. Key issues are data-channel vulnerabilities, fleet-level attack amplification, trade-offs between security measures and real-time responsiveness, and the need for standards and coordinated governance to ensure interoperable and resilient operation.

3.3.2 Causal Summary



3.4 User Trust and Acceptance

Literature consistently identifies user trust and acceptance as central determinants of whether intelligent mobility solutions will succeed beyond pilot projects [6][10][12][15]. Even if technical performance is adequate, a lack of user confidence can block adoption and regulatory approval. Trust depends on perceptions of safety, transparency of system operation, and the reliability of interactions with automation (Fagnant & Kockelman, 2015; Goodall, 2014; Shaheen et al., 2016; Kalra & Paddock, 2016).

Studies highlight that over-reliance and under-trust are equally problematic: over-trust can result in unsafe complacency, while lack of trust leads to rejection of otherwise capable systems (Fagnant & Kockelman, 2015; Kalra & Paddock, 2016). Transparency through explainable system behaviour, clear communication of operational limits, and consistent feedback builds appropriate trust calibration (Goodall, 2014; Shaheen et al., 2016). Research also emphasizes that long-term user experience, cultural context, and exposure to safe automated operation influence acceptance far more than technical specifications alone (Fagnant & Kockelman, 2015; Shaheen et al., 2016).

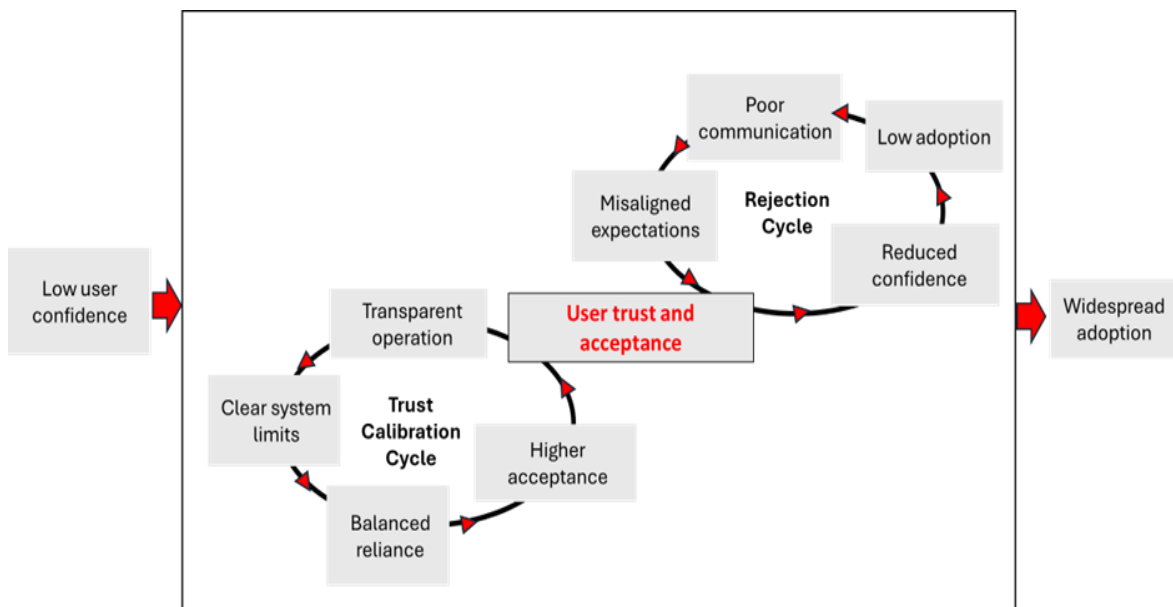
Validation efforts show that staged deployments, controlled trials, and education campaigns can improve acceptance by gradually familiarizing users with the technology (Kalra & Paddock, 2016). However, gaps remain in understanding societal differences in expectations, liability perceptions, and the ethics of machine decision-making (Goodall, 2014). The litera-

ture converges on the need for not only technical reliability but also social readiness and governance frameworks to support trust-based adoption.

3.4.1 Summary

User trust and acceptance determine adoption outcomes regardless of technical readiness. Key factors include perceived safety, transparency of operation, balanced trust calibration, cultural differences, and staged exposure to automation.

3.4.2 Causal Summary



3.5 Ethical and Regulatory Challenges

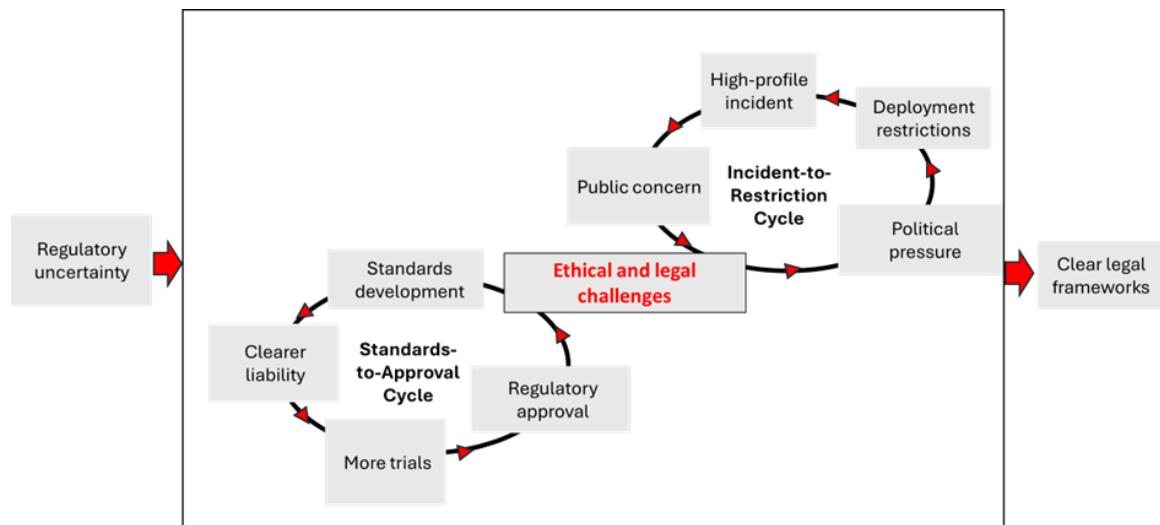
Literature highlights ethical dilemmas and legal uncertainty as major non-technical barriers to automated driving. Ethical debate centres on decision-making in unavoidable crash scenarios, value-sensitive design, and algorithmic transparency; experimental work such as the Moral Machine shows strong variation in public moral preferences, complicating any single ethical prescription (Awad et al., 2018; Goodall, 2014).

Legal issues include ambiguity over liability when control shifts between human and machine, gaps in existing vehicle and product regulation, and the need for harmonized standards across jurisdictions to enable cross-border deployment (OECD/ITF, 2015; Khan et al., 2023). Scholars argue that ethics and law are tightly coupled: unclear legal regimes delay field trials and commercialization, while ethical controversies shape public perception and political responses that lead to regulatory action or constraint (Milakis et al., 2017; Khan et al., 2023). The literature therefore treats ethical and legal readiness as prerequisites for socially acceptable, scalable deployment of intelligent mobility systems (Awad et al., 2018; OECD/ITF, 2015; Khan et al., 2023).

3.5.1 Summary

Ethical disagreement and regulatory uncertainty hinder deployment. Key concerns are moral decision-making in critical incidents, unclear liability rules for automated control, and the lack of harmonized standards and governance across jurisdictions.

3.5.2 Causal Summary



3.6 Equity and inclusivity

Literature highlights that automated driving and intelligent mobility systems risk reinforcing existing inequities if inclusivity is not actively addressed (Harper et al., 2016; World Health Organization, 2018; Lyons, 2018). Access gaps may arise where deployment prioritizes affluent urban centers while rural or low-income communities face limited coverage and higher costs (Harper et al., 2016). Digital divides also emerge when services require smartphones, credit access, or digital literacy, excluding vulnerable populations such as the elderly or disabled (World Health Organization, 2018).

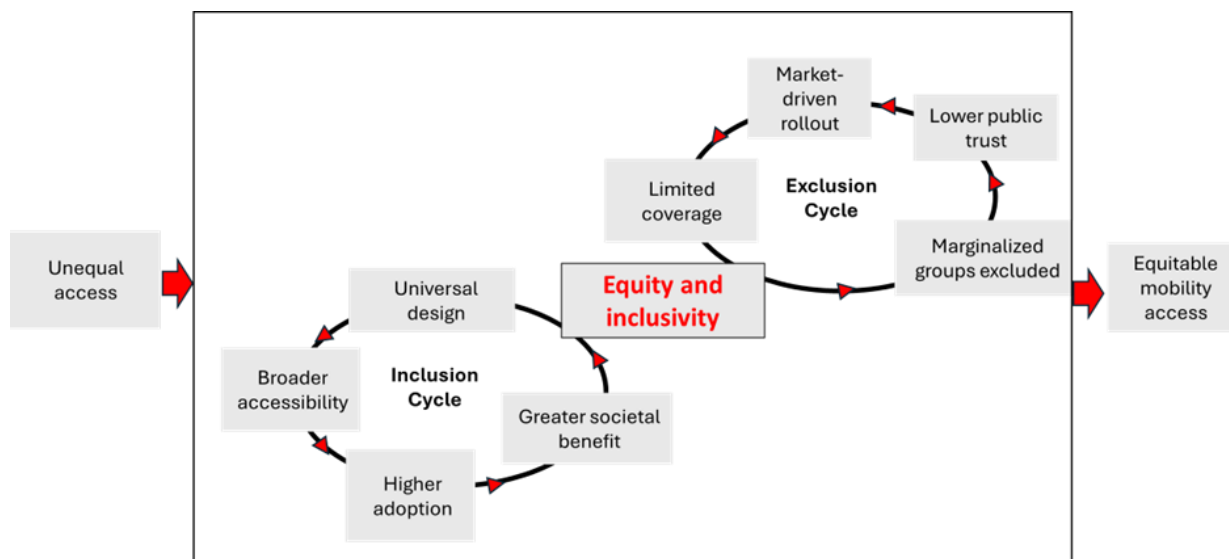
Inclusivity challenges extend to design: user interfaces, safety validation, and service models often underrepresent the needs of women, minorities, and persons with disabilities (Lyons, 2018). Research stresses the importance of universal design principles, subsidized pricing models, and community-engaged planning to ensure that benefits of automation are broadly shared (World Health Organization, 2018; Lyons, 2018).

Scholars also note that equitable outcomes require policy intervention, because market-driven rollouts tend to favor profitability over universal accessibility (Harper et al., 2016). Overall, equity and inclusivity are treated as not only social obligations but also enablers of long-term acceptance: excluding key groups risks political backlash, undermines trust, and limits the transformative potential of intelligent mobility systems (Harper et al., 2016; World Health Organization, 2018; Lyons, 2018).

3.6.1 Summary

Automation risks exacerbating inequities unless inclusivity is addressed through universal design, affordable access, and equitable deployment strategies. Vulnerable groups such as rural communities, the elderly, and people with disabilities are most at risk of exclusion.

3.6.2 Causal Summary



4. Conclusion

4.1 Convergence of Practice and Research

The webinar by Prof. Nobuyuki Ozaki emphasized both the technological and societal challenges in transitioning to intelligent mobility solutions. Central themes included the reliability of autonomous systems, human–machine interaction, cybersecurity, regulatory frameworks, and societal acceptance. These themes align closely with the factors identified in the literature, confirming that the concerns raised in academic research are mirrored in expert discussions at policy and practice forums.

A key point of convergence is reliability: both the webinar and literature agree that safe deployment cannot advance without demonstrable system robustness under diverse real-world conditions. Human–machine interaction was also emphasized in both domains, particularly the risks of driver disengagement and the need for intuitive interfaces to manage handovers. Similarly, cybersecurity was highlighted in the webinar as a foundational issue, which the literature also treats as a prerequisite for deployment at scale.

Where the webinar adds nuance is in its focus on the practical dynamics of deployment, including examples from Japan that illustrate how societal readiness, regulatory frameworks, and inclusivity policies shape adoption. While literature provides systematic studies on trust calibration, ethical challenges, and inclusivity, the webinar stresses their urgency by grounding them in real-world experiences and governance contexts.

In contrast, the literature sometimes approaches these themes more abstractly, framing them as long-term research gaps rather than immediate deployment barriers. Taken together, the webinar and literature show strong consensus on the central challenges, while differing in emphasis: the webinar anchors the issues in ongoing deployment practice, whereas the literature elaborates analytical depth, experimental evidence, and theoretical framing. This complementarity highlights the value of integrating practitioner insights with academic research to obtain a balanced understanding of the transition toward intelligent mobility.

4.2 Additional learnings from the literature

While the webinar provided a broad practitioner-oriented overview of challenges in transitioning to intelligent mobility, the literature expands on these themes with additional depth and specificity. One area where the literature adds significantly is in empirical validation of system reliability. Whereas the webinar emphasized the general need for robust performance, research studies quantify this through simulation methods, redundancy strategies, and safety benchmarks that must be achieved before commercial deployment.

The literature also provides more detailed insights into human–machine interaction. Beyond the webinar’s focus on disengagement and handovers, academic work examines multimodal interface design, cognitive load effects, and driver monitoring techniques, offering concrete approaches to improve trust calibration and situational awareness.

Another contribution is the strong emphasis on equity and inclusivity, which the webinar touched upon primarily through policy examples. Research broadens this to include rural accessibility, digital divides, and the underrepresentation of vulnerable groups such as the elderly and disabled, underscoring the need for universal design and community-engaged deployment strategies.

Finally, while the webinar underlined the urgency of governance and regulation, the literature elaborates on ethical dilemmas and liability frameworks, highlighting moral decision-making models, jurisdictional differences, and potential pathways for harmonization. These discussions show that ethical and legal readiness must progress in parallel with technological maturity.

Overall, the literature extends the webinar’s insights by grounding them in quantitative evidence, experimental results, and broader societal analysis, thereby providing a more systematic foundation for policy and implementation decisions.

4.3 Final thoughts on " Transition to Intelligent Mobility"

The transition to intelligent mobility is not solely a matter of technological readiness; it is equally shaped by societal acceptance, governance frameworks, and ethical considerations. The evidence reviewed in this paper demonstrates that while progress in automation, cybersecurity, and validation continues to advance, deployment will stall if issues of trust, equity, and regulation are neglected. Prof. Ozaki’s webinar provided a practitioner’s perspective on the urgency of these concerns, while the literature added depth through empirical studies, structured models, and broader societal analysis.

Taken together, both sources reinforce the conclusion that intelligent mobility is best understood as a socio-technical system: technological innovation and social alignment must move forward in parallel. Safe, inclusive, and equitable deployment requires not just technical breakthroughs, but also governance models that balance innovation with accountability, and social strategies that ensure benefits are distributed fairly.

As intelligent mobility evolves, the critical task is to bridge the gap between what technology can achieve and what society is prepared to accept. Addressing this gap will determine whether intelligent mobility emerges as a transformative solution that enhances safety, accessibility, and sustainability, or whether it remains constrained by unresolved societal and institutional challenges.

4.4 Limitations of this Study

This study draws upon insights from both a practitioner-focused webinar and academic literature to examine the technological and societal challenges associated with the transition to intelligent mobility. While this dual-source approach provides a balanced perspective, certain limitations must be acknowledged.

The analysis relies on a single expert webinar by Prof. Nobuyuki Ozaki, which, although valuable, does not capture the diversity of practitioner viewpoints from other regions, industries, or governance contexts. Similarly, while the literature review integrates a wide range of studies, it may not fully reflect the rapidly evolving developments in areas such as autonomous system validation, cybersecurity frameworks, and ethical governance.

Another limitation arises from the thematic nature of the study. While the discussion references empirical findings, simulation studies, and performance benchmarks, no independent data collection or quantitative evaluation was conducted. As a result, the conclusions remain interpretive rather than predictive. Moreover, the findings are discussed primarily within the contexts presented in the webinar and selected literature, which may limit generalizability. Regional and cultural variations in adoption, regulatory maturity, and societal readiness are only partially addressed, and more comprehensive cross-regional analyses would be necessary to capture the full global picture.

4.5 Scope of Future Work

Future research on intelligent mobility should deepen and broaden the investigation into both technological and societal dimensions. Expanding the scope of practitioner insights to include perspectives from diverse geographies, regulatory environments, and industry sectors would enrich the understanding of deployment challenges and reveal variations in policy approaches and adoption strategies. Similarly, incorporating a wider range of academic sources, including the most recent empirical studies and simulation models, would strengthen the evidence base for assessing system reliability, safety performance, and human–machine interaction.

There is also significant potential to integrate more empirical and data-driven approaches into future work. Large-scale field trials, controlled experiments, and longitudinal studies could provide robust evidence on critical aspects such as trust calibration, user behaviour, and safety validation under real-world conditions. Additionally, emerging themes such as ethical decision-making in autonomous systems, cybersecurity resilience, and data governance require more focused investigation, given their increasing importance in shaping deployment outcomes.

Finally, future studies should place stronger emphasis on equity and inclusivity, exploring strategies to ensure that intelligent mobility benefits are accessible to rural populations, elderly users, and individuals with disabilities. Addressing these dimensions will require interdisciplinary collaboration between technologists, policymakers, ethicists, and social scientists to design frameworks that balance innovation with accountability and fairness. By combining technical evidence with societal insights, future research can better inform policy and accelerate the responsible, inclusive, and sustainable transition to intelligent mobility.

Bibliography

- Anderson, J. M., Kalra, N., Stanley, K. D., Sorensen, P., Samaras, C., & Oluwatola, O. A. (2016). *Autonomous vehicle technology: A guide for policymakers*. RAND Corporation.
- Awad, E., Dsouza, S., Kim, R., Schulz, J., Henrich, J., Shariff, A., ... & Rahwan, I. (2018). The moral machine experiment. *Nature*, 563(7729), 59–64.
- Fagnant, D. J., & Kockelman, K. (2015). Preparing a nation for autonomous vehicles: Opportunities, barriers and policy recommendations. *Transportation Research Part A: Policy and Practice*, 77, 167–181.
- Goodall, N. J. (2014). Machine ethics and automated vehicles. In *Road Vehicle Automation* (pp. 93–102). Springer, Cham.
- Harper, C. D., Hendrickson, C. T., Mangones, S., & Samaras, C. (2016). Estimating potential increases in travel with autonomous vehicles for the non-driving, elderly and people with travel-restrictive medical conditions. *Transportation Research Part C: Emerging Technologies*, 72, 1–9.
- Kalra, N., & Paddock, S. M. (2016). Driving to safety: How many miles of driving would it take to demonstrate autonomous vehicle reliability. RAND Corporation.
- Khan, S. K., et al. (2023). CAV cybersecurity and regulatory readiness. *Transport Policy*, 143, 58–71.
- Koopman, P., & Wagner, M. (2016). Challenges in autonomous vehicle testing and validation. *SAE International Journal of Transportation Safety*, 4(1), 15–24.
- Kyriakidis, M., Happee, R., & de Winter, J. C. F. (2015). Public opinion on automated driving: Results of an international questionnaire among 5,000 respondents. *Transportation Research Part F: Traffic Psychology and Behaviour*, 32, 127–140.
- Litman, T. (2020). *Autonomous vehicle implementation predictions: Implications for transport planning*. Victoria Transport Policy Institute Report.
- Lyons, G. (2018). Getting smart about urban mobility – Aligning the paradigms of smart and sustainable. *Transportation Research Part A: Policy and Practice*, 115, 4–14.
- Milakis, D., van Arem, B., & van Wee, B. (2017). Policy and society related implications of automated driving: A review of literature and directions for future research. *Journal of Intelligent Transportation Systems*, 21(4), 324–348.
- OECD/ITF. (2015). Automated and autonomous driving: Regulation under uncertainty. *International Transport Forum Policy Papers*, No. 7. OECD Publishing, Paris.
- Shaheen, S., Cohen, A., & Zohdy, I. (2016). *Shared mobility: Current practices and guiding principles*. U.S. Department of Transportation, Federal Highway Administration.
- Shladover, S. E. (2018). Connected and automated vehicle systems: Introduction and overview. *Journal of Intelligent Transportation Systems*, 22(3), 190–200.
- Wadud, Z., MacKenzie, D., & Leiby, P. (2016). Help or hindrance? The travel, energy and carbon impacts of highly automated vehicles. *Transportation Research Part A: Policy and Practice*, 86, 1–18.
- World Health Organization. (2018). *Global status report on road safety 2018*. Geneva: World Health Organization.

People, Art & Culture

Celebrating shared and unique cultural expressions

- 1) **Harmony in Life:**
A Japanese Framework for Modern Well-Being
Anandhi VijayasankarPg.141





秋葉原

あきはばら

山 区

御徒町

神田

Kanda

AKIhabara

OKachimachi

オリジナル Kyoto
京都



やき
礎屋
ISHIZUYA Inc

Doragon
ドラゴン



やき

味自慢

屋



Harmony in Life: A Japanese Framework for Modern Well-Being

Abstract:

This paper explores Japanese philosophical frameworks of well-being as an alternative to Western models that equate success with achievement, consumption, and external validation. Drawing on concepts such as *ikigai* (purpose), *wabi-sabi* (acceptance of imperfection), *kaizen* (continuous improvement), and *wa* (harmony), Japanese wisdom offers a holistic approach that integrates purpose, health, resilience, social harmony, and sustainability. By examining five interconnected domains—meaning, physical health, resilience, community, and growth—the paper highlights how Japanese thought provides a sustainable, balanced framework for modern well-being, relevant to both individual and societal contexts.



ANANDHI VIJAYASANKAR

Research Associate,
Mizuho India Japan Study Centre
Indian Institute of Management
Bangalore

Index of Contents

1. Introduction
2. Core Japanese Philosophies: A System of Well-Being
 - 2.1 Physical Well-being: Mindful Relationship with the Body
 - 2.2 Mental Well-being: Purpose, Growth, and Clarity
 - 2.3 Emotional Well-being: Acceptance, Resilience, and Perseverance
 - 2.4 Social and Environmental Well-being: Interconnection and Sustainability
3. Integration: A System of Harmony
4. Implications for Modern Life
 - 4.1 Individual Applications
 - 4.2 Organizational Applications
 - 4.3 Societal Applications
5. Conclusion

1. Introduction

In a world where Western culture celebrates relentless growth, achievement, and consumption as markers of success, Japanese philosophy offers a profoundly different path—one that prioritizes harmony, balance, and sustainability as the foundations of a life well-lived (Oishya, 2025; Big Think, 2023; Uchitani, 2020). While the West often views happiness as a destination to be reached through external accomplishments, Japanese wisdom reveals that true well-being emerges from cultivating inner balance and harmonious relationships with ourselves, others, and nature (Apeejay News, 2025; Japan Forward, 2025).

However, recent philosophical discourse challenges even this traditional two-pillar model of happiness and meaning. Professor Lorraine Besser's groundbreaking research introduces a compelling "three-legged stool" framework that expands beyond the conventional understanding of well-being to include psychological richness—a dimension that brings complexity, novelty, and cognitive engagement to life (Besser, 2025). This framework offers intriguing parallels and contrasts with Japanese approaches to flourishing.

Japanese philosophies provide a cohesive, time-tested framework for living well by integrating physical, mental, emotional, and social dimensions of life into a unified whole. Rather than treating these aspects as separate domains requiring different strategies, Japanese thought demonstrates how ancient principles like *ikigai* (life purpose), *wabi-sabi* (embracing imperfection), *kaizen* (continuous improvement), and *wa* (harmony) work together to create sustainable well-being (Marlee, 2024; Positive Psychology, 2025; Clear, 2018; [Onlinescientificresearch.com](https://onlinescientificresearch.com), 2025).

This exploration examines five interconnected domains where Japanese wisdom transforms modern approaches to wellness: the cultivation of purpose and meaning, the optimization of physical health through mindful practices, the development of emotional resilience through acceptance of imperfection, the fostering of social harmony and environmental sustainability, and the integration of continuous growth with inner peace.

1.1 Foundations of a Harmonious Life

Across cultures, the definition of "a good life" varies dramatically. Western positive psychology traditionally emphasizes individual achievement, personal happiness, and self-actualization as primary markers of well-being (Psychology Today, 2012; [Onlinescientificresearch.com](https://onlinescientificresearch.com), 2025). However, Japanese culture approaches flourishing through a fundamentally different lens—one that views the individual as inseparable from their relationships, community, and natural environment (Japan Forward, 2025; Nakagawa et al., 2022).

Professor Besser's research adds a crucial dimension to this conversation by arguing that both Western and Japanese approaches may be incomplete without considering psychological richness—"the capacity for complex emotional and cognitive experiences that broaden our understanding of the world" (Besser, 2025, p. 3). Her critique of purely purpose-driven approaches resonates with certain limitations observed in rigid interpretations of Japanese concepts: "An overly rigid focus on purpose has its drawbacks... People frequently expect that attaining their goals will bring profound satisfaction, but many report feeling underwhelmed once they have reached them" (Besser, 2025, p. 3).

The Japanese orientation toward balance, impermanence, and community emerges from centuries of Buddhist, Shinto, and Confucian influences (Bokksu, 2024; World Economic Forum, 2019). Buddhist philosophy contributes the understanding of impermanence (*mujo*) and interdependence, recognizing that all phenomena are interconnected and constantly changing (Omaritani, 2023; Mind Forest AI, 2025). Shinto traditions emphasize harmony with nature and respect for the inherent spirit (*kami*) in all things (Uchitani, 2020; Bokksu, 2024). Confucian ethics add the importance of social roles, mutual respect, and collective well-being (Stanford Encyclopedia of Philosophy, 2019).

This philosophical foundation creates a unique understanding of well-being where individual flourishing cannot be separated from social harmony and environmental sustainability. Unlike Western models that often treat physical health, mental clarity, emotional stability, and social connection as separate goals requiring different interventions, Japanese principles present these domains as naturally integrated aspects of a harmonious life (Frontiers in Psychology, 2024).

Research comparing Japanese and Western approaches to well-being reveals significant differences in how psychological health is conceptualized and achieved (Nakagawa et al., 2022; Onlinescientificresearch.com, 2025). While Western positive psychology emphasizes personal control, individual expression, and high-arousal positive emotions, Japanese well-being focuses more on social adjustment, interpersonal harmony, and low-arousal contentment (Nakagawa et al., 2022; Frontiers in Psychology, 2024). This cultural difference suggests that Japanese principles offer valuable insights for creating more sustainable and community-oriented approaches to modern wellness.

2. Core Japanese Philosophies: A System of Well-Being

2.1 Physical Well-being: Mindful Relationship with the Body

Japanese approaches to physical health emphasize mindful awareness, moderation, and connection with nature rather than aggressive optimization or extreme measures, principles that align with Besser's emphasis on complex, engaging experiences.

Hara Hachi Bu represents perhaps the most practical wisdom for modern eating challenges. This Okinawan principle of eating until 80% full has been practiced for over 300 years and is strongly linked to exceptional longevity (Economic Times, 2025; Times of India, 2025). Rather than focusing on restrictive dieting or calorie counting, *hara hachi bu* teaches awareness of satiety signals and prevents the overconsumption that strains digestive systems and contributes to obesity (Clark's Healthcare, 2025; Healthshots, 2025). Research shows this practice is associated with lower rates of cardiovascular disease, cancer, and diabetes among Okinawan populations, who demonstrate some of the world's highest concentrations of centenarians (Economic Times, 2025; See How You Eat, 2025).

Washoku, Japan's traditional dietary pattern, provides a comprehensive model for nutritious eating that extends far beyond individual food choices (News Medical, 2025; The Times of India, 2025). Recognized by UNESCO as an Intangible Cultural Heritage, *washoku* emphasizes seasonal ingredients, minimal processing, balanced nutrition, and social connection around meals (Medindia, 2025; Kikkoman, 2025). The diet's foundation includes rice, miso soup, fish, soy products, seaweed, mushrooms, and vegetables, creating a nutrient-dense, fiber-rich

pattern that supports both physical health and environmental sustainability (News Medical, 2025; Blue Zones, 2024). Studies demonstrate that adherence to *washoku* principles reduces cardiovascular disease mortality by 17%, stroke by 20%, and heart disease by 19% (News Medical, 2025; Medindia, 2025).

Shinrin-yoku (forest bathing) demonstrates how Japanese wisdom integrates physical health with environmental connection and psychological richness (Forest Holidays, 2017; Li et al., 2009). This practice involves mindful immersion in forest environments, engaging all senses rather than focusing on exercise or achievement (Healthline, 2025; Cleveland Clinic, 2023). Scientific research confirms that forest bathing reduces stress hormones like cortisol and adrenaline, lowers blood pressure and heart rate, boosts immune function through increased natural killer cell activity, and improves sleep quality (Li et al., 2009; PMC, 2022). The practice also reduces symptoms of anxiety, depression, and fatigue while increasing feelings of vigor (PMC, 2022; Healthline, 2025).

2.2 Mental Well-being: Purpose, Growth, and Clarity

Japanese mental well-being philosophy emphasizes finding meaning through service, maintaining beginner's mind, and embracing continuous improvement rather than pursuing fixed states of happiness—concepts that complement Besser's notion of psychological richness through novelty and challenge.

Ikigai, often translated as "reason for being," provides a framework for discovering purpose that integrates personal passion with social contribution (Marlee, 2024; University of Pennsylvania, 2023). Unlike Western goal-setting that often focuses on individual achievement, *ikigai* emerges from the intersection of what you love, what you're good at, what the world needs, and what you can be paid for (Positive Psychology, 2025; Rostone Opex, 2022). However, authentic Japanese *ikigai* is less concerned with the commercial intersection model popularized in the West and more focused on finding joy and meaning in daily activities that contribute to community well-being (Marlee, 2024; Nakagawa et al., 2022). Research among Japanese older adults shows that having *ikigai* reduces risk of functional disability, dementia, psychological distress, and mortality while improving subjective well-being and life satisfaction (Nakagawa et al., 2022).

Interestingly, Besser's research suggests that an exclusive focus on purpose might limit psychological richness: "When we concentrate solely on achieving a particular goal, we may overlook other enriching experiences that contribute to psychological richness. Novelty, spontaneity, and adventure are often pushed aside in the pursuit of purpose" (Besser, 2025, p. 3). This insight suggests that *ikigai* works best when balanced with openness to unexpected experiences and cognitive engagement.

Shoshin (beginner's mind) offers powerful medicine for the expertise trap that limits learning and innovation (Clear, 2018; Wikipedia, 2005). This Zen concept encourages approaching situations with openness, curiosity, and lack of preconceptions, even at advanced skill levels (Clear, 2018; Lion's Roar, 2024). As Zen master Shunryo Suzuki famously stated, "In the beginner's mind there are many possibilities, but in the expert's there are few" (Clear, 2018; Lion's Roar, 2024). *Shoshin* counteracts the cognitive biases and closed-mindedness that often accompany expertise, fostering creativity, adaptability, and continued growth throughout life

(Clear, 2018; CAC, n.d.). This principle directly supports Besser's emphasis on remaining open to novel experiences and cognitive challenges.

Kaizen (continuous improvement) transforms the Western obsession with dramatic transformation into a sustainable philosophy of incremental progress (Kaizen Institute, 2024; TechTarget, 2021). Rather than seeking radical changes that often lead to burnout or failure, *kaizen* focuses on small, consistent improvements that compound over time (TechTarget, 2021; Wikipedia, 2003). This approach reduces the stress and anxiety associated with major life changes while building sustainable habits and systems (Kaizen Institute, 2024; Businessmap, 2025). In business contexts, *kaizen* has proven effective for improving quality, reducing waste, and engaging all organizational levels in problem-solving (ToolsHero, 2024; Virtuzone, 2024).

2.3 Emotional Well-being: Acceptance, Resilience, and Perseverance

Japanese emotional wisdom emphasizes accepting imperfection, building resilience through community support, and persevering with dignity rather than avoiding difficulties or pursuing constant happiness—an approach that naturally incorporates the complex emotions Besser identifies as essential to psychological richness.

Wabi-sabi provides a profound antidote to perfection-seeking that creates stress and dissatisfaction in modern life (Omaritani, 2023; Mind Forest AI, 2025). This aesthetic philosophy finds beauty in imperfection, impermanence, and incompleteness, recognizing these qualities as fundamental aspects of existence rather than flaws to be corrected (Kinboru, 2025; Siegfried Blog, 2023). *Wabi-sabi* teaches that striving for perfection is not only impossible but also misses the authentic beauty found in natural aging, weathering, and change (Mind Forest AI, 2025; Kinboru, 2025). Psychologically, embracing *wabi-sabi* reduces anxiety about mistakes, increases self-compassion, and fosters resilience in the face of life's inevitable challenges (Mind Forest AI, 2025; Siegfried Blog, 2023).

Besser's research supports this approach to complex emotions: "One of the most valuable insights from research on psychological richness is that experiencing complex emotions, including painful ones, is not inherently bad... we can learn to sit with them, acknowledge them, and understand that experiencing pain does not mean life is not worth living" (Besser, 2025, p. 8). This perspective aligns closely with *wabi-sabi's* acceptance of imperfection and impermanence.

Ganbaru (perseverance) offers a culturally specific approach to resilience that emphasizes effort over outcome and community support over individual struggle (Indian Express, 2025; Child Research Network, 2018). Rather than viewing persistence as a solitary virtue, *ganbaru* is practiced collectively, with community members encouraging each other through difficult times with expressions like "*ganbatte*" (keep trying) and "*ganbaro*" (let's persevere together) (Child Research Network, 2018; Wikipedia, 2011). This philosophy teaches that the value lies in giving full effort regardless of circumstances, reducing the stress and discouragement that come from attachment to specific outcomes (Indian Express, 2025; Goju Karate, 2023). Research shows that *ganbaru* fosters consistency, reduces performance anxiety, builds stronger relationships through mutual encouragement, and develops long-term resilience (Child Research Network, 2018).

2.4 Social and Environmental Well-being: Interconnection and Sustainability

Japanese philosophy recognizes that individual well-being cannot be separated from social harmony and environmental health, offering practices that strengthen both community bonds and ecological sustainability.

Mottainai expresses regret over waste and embodies a comprehensive approach to resource appreciation that extends far beyond environmental conservation (Bokksu, 2024; World Economic Forum, 2019). Rooted in Buddhist philosophy of frugality and Shinto beliefs about the inherent spirit in all objects, *mottainai* cultivates gratitude for resources while minimizing waste through reuse, repair, and mindful consumption (Bokksu, 2024; Wabi Sabi JP, 2024). This concept gained international recognition through Kenyan Nobel Peace Prize winner Wangari Maathai, who championed it as the "fourth R" (Respect) alongside Reduce, Reuse, and Recycle (World Economic Forum, 2019). Practicing *mottainai* reduces environmental impact, increases appreciation for possessions, and fosters a sense of connection to the broader web of life (Bokksu, 2024; BBC, 2024).

Wa (harmony) provides the social foundation for Japanese well-being by emphasizing interpersonal harmony, group cohesion, and collective welfare over individual assertion (Uchitani, 2020; Onlinescientificresearch.com, 2025). This principle manifests in communication styles that prioritize maintaining social harmony over expressing individual opinions, decision-making processes that seek consensus rather than majority rule, and conflict resolution approaches that preserve relationships while addressing problems (Uchitani, 2020; Frontiers in Psychology, 2024). While *wa* can sometimes suppress individual expression, when practiced skillfully it creates social environments characterized by mutual respect, collective responsibility, and shared prosperity (Onlinescientificresearch.com, 2025; Frontiers in Psychology, 2024).

3. Integration: A System of Harmony

The profound strength of Japanese well-being philosophy lies not in any individual practice but in how these principles reinforce and amplify each other to create a comprehensive system of harmony. Unlike Western approaches that often treat physical fitness, mental health, emotional regulation, and social connection as separate domains requiring different experts and interventions, Japanese wisdom demonstrates how these aspects naturally integrate when approached through the lens of balance and interconnection (Oishya, 2025; Onlinescientificresearch.com, 2025).

Professor Besser's three-legged stool model provides an interesting framework for understanding this integration. Her research suggests that "the best possible life includes all three elements—happiness, meaning, and psychological richness—in varying degrees, depending on individual preferences and circumstances" (Besser, 2025, p. 2). Japanese philosophy naturally incorporates all three dimensions: *ikigai* provides meaning, practices like *washoku* and social harmony contribute to happiness, and the constant interplay of acceptance (*wabi-sabi*) with improvement (*kaizen*) creates the cognitive complexity and novelty that Besser identifies as psychological richness.

Consider how *ikigai* (purpose) naturally integrates with *washoku* (traditional diet) and *shinrin-yoku* (forest bathing). A person's sense of purpose often includes caring for family and community, which motivates preparation of nutritious traditional meals that strengthen social bonds. This same purpose might lead to regular nature walks that combine physical exercise with stress reduction and spiritual renewal. The practices support each other rather than competing for time and energy (Nakagawa et al., 2022; Blue Zones, 2024).

Similarly, *wabi-sabi* (acceptance of imperfection) reinforces *kaizen* (continuous improvement) by removing the perfectionism that often paralyzes progress. When we accept that all efforts will be imperfect, we become willing to make small improvements without waiting for ideal conditions. This creates sustainable progress without the burnout associated with perfectionist approaches to change (Omaritani, 2023; TechTarget, 2021).

The *mottainai* principle (avoiding waste) integrates seamlessly with *hara hachi bu* (eating to 80% fullness) and *wa* (social harmony). Avoiding food waste through mindful portions demonstrates respect for resources while supporting personal health and modeling considerate behavior for the community (Economic Times, 2025; Bokksu, 2024).

When compared to Western frameworks like positive psychology, Stoicism, or contemporary wellness culture, Japanese principles offer several distinctive advantages (Onlinescientificresearch.com, 2025). Western positive psychology, while valuable, often emphasizes individual traits like optimism, gratitude, and resilience as personal characteristics to be developed through specific interventions (Nakagawa et al., 2022; Psychology Today, 2012). Japanese philosophy, by contrast, views these qualities as naturally emerging from right relationship—with oneself, others, and the environment (Japan Forward, 2025; Onlinescientificresearch.com, 2025).

Besser's critique adds nuance to this comparison: "A life focused solely on happiness can feel superficial, while a life centered only on meaning can become too rigid or burdensome. Psychological richness adds depth and dynamism to our lives" (Besser, 2025, p. 2). This insight suggests that Japanese principles work best when they maintain openness to unexpected experiences and cognitive challenges rather than becoming rigid systems.

Stoic philosophy shares some similarities with Japanese thought in its emphasis on accepting what cannot be changed, but it tends toward individual self-control rather than the social harmony and environmental interconnection central to Japanese approaches (StudySmarter, 2024). Contemporary wellness culture often treats practices like meditation, healthy eating, and exercise as lifestyle choices for personal optimization, while Japanese wisdom embeds these activities within larger frameworks of meaning, community, and service (Oishya, 2025; Indian Express, 2025).

The Japanese model's integration across life domains creates several practical advantages. First, it reduces the fragmentation and time management challenges of treating health, relationships, work, and personal growth as separate projects requiring different schedules and resources. Second, it provides inherent motivation by connecting daily practices to larger purposes and community well-being. Third, it creates sustainable approaches by working with natural human tendencies toward meaning, connection, and growth rather than against them

(Nakagawa et al., 2022; Onlinescientificresearch.com, 2025).

Research comparing individualistic and collectivistic approaches to mental health reveals important insights about this integration (Frontiers in Psychology, 2024). While Western individualistic cultures often achieve well-being through personal control and self-expression, collectivistic cultures like Japan tend to find well-being through social adjustment and interpersonal harmony (Nakagawa et al., 2022; Frontiers in Psychology, 2024). However, the most psychologically healthy individuals often demonstrate flexibility in drawing from both approaches as situations require (Frontiers in Psychology, 2024).

4. Implications for Modern Life

The practical applications of Japanese well-being philosophy extend across individual lifestyle choices, organizational culture, and broader social policy, offering concrete alternatives to the stress and fragmentation characterizing much of modern life.

4.1 Individual Applications

For personal health and lifestyle, Japanese principles provide immediately applicable frameworks that address modern challenges without requiring radical life changes. The practice of *hara hachi bu* offers a sustainable approach to the obesity epidemic by focusing on internal awareness rather than external restriction (Economic Times, 2025; Clark's Healthcare, 2025). Instead of following complicated diet rules, individuals learn to recognize satiety signals and stop eating before feeling completely full, naturally reducing caloric intake while improving digestion (Times of India, 2025; Healthshots, 2025).

Besser's research supports this mindful approach while adding the dimension of psychological richness. She emphasizes the importance of "seeking out novelty" and remaining "open to new experiences" while maintaining self-awareness about when we need comfort and stability (Besser, 2025, pp. 5-6). This balance between challenge and security aligns with Japanese principles of continuous improvement within harmonious frameworks.

Shinrin-yoku provides accessible stress management that requires no special equipment or training—simply mindful time spent in natural environments (Forest Holidays, 2017; Healthline, 2025). For urban dwellers with limited forest access, research shows that even city parks provide measurable benefits when approached with the same mindful awareness (Li et al., 2009; PMC, 2022). The practice integrates physical activity, stress reduction, and spiritual renewal into a single activity that can be adapted to any schedule or fitness level (Healthline, 2025; Indian Express, 2024).

The combination of *ikigai* and *kaizen* transforms approaches to career development and personal growth. Rather than pursuing dramatic career changes or overwhelming self-improvement projects, individuals can identify small ways to increase meaning and contribution in their current circumstances while making incremental improvements over time (Marlee, 2024; Kaizen Institute, 2024). This reduces the anxiety and paralysis often associated with major life decisions while building sustainable momentum toward more fulfilling lives (TechTarget, 2021; Nakagawa et al., 2022).

4.2 Organizational Applications

Japanese business philosophy has already demonstrated significant success in organizational contexts, but broader applications of these principles could transform workplace culture and productivity (ToolsHero, 2024; Kaizen Institute, 2025). *Kaizen* approaches to continuous improvement engage all organizational levels in identifying and solving problems, creating cultures of shared responsibility and innovation rather than top-down control (Kaizen Institute, 2024; Virtuzone, 2024).

The *gemba* principle (going to where the real work happens) encourages leaders to maintain direct contact with frontline operations, improving decision-making and employee engagement (ToolsHero, 2024; Kaizen Institute, 2025). This approach contrasts sharply with remote management styles that rely primarily on metrics and reports rather than direct observation and relationship-building (Virtuzone, 2024).

Mottainai principles applied to organizational sustainability create comprehensive approaches to resource conservation that engage employee creativity and commitment while reducing environmental impact (Bokksu, 2024; News Medical, 2025). Rather than treating sustainability as compliance requirement, organizations can cultivate cultures of gratitude and resourcefulness that simultaneously reduce costs and increase meaning (World Economic Forum, 2019; Wabi Sabi JP, 2024).

Modern workplace stress and burnout might be addressed through Japanese concepts like *yutori* (creating space for reflection and rest) and *wa* (prioritizing social harmony and collective well-being over individual competition) (Indian Express, 2025; Times Now News, 2025). Companies experimenting with these approaches report reduced employee turnover, increased creativity, and improved mental health outcomes (World Economic Forum, 2024; Indian Express, 2024).

4.3 Societal Applications

At the societal level, Japanese principles offer frameworks for addressing public health challenges, educational approaches, and community building that emphasize prevention and systems thinking rather than crisis intervention.

Public health applications of Japanese wisdom focus on creating social and environmental conditions that naturally support well-being rather than treating individual pathology (News Medical, 2025; Blue Zones, 2024). The integration of *washoku* dietary principles into school meal programs, urban planning that incorporates access to nature for *shinrin-yoku*, and community programs that foster *ikigai* among older adults could address multiple health challenges simultaneously (The Times of India, 2025; Healthline, 2025).

Educational applications of *shoshin* (beginner's mind) and *kaizen* (continuous improvement) could transform learning approaches from competitive, test-focused systems to collaborative, growth-oriented environments (Clear, 2018; Medha, 2023). Research suggests that students develop better long-term learning outcomes when approached through curiosity and incremental improvement rather than high-stakes evaluation (Child Research Network, 2018; Lion's Roar, 2024).

Community building applications of *wa* (harmony) and *mottainai* (avoiding waste) could address social isolation and environmental degradation simultaneously through programs that bring people together around shared resources and collective care (Uchitani, 2020; Bokksu, 2024). Community gardens, tool libraries, skill-sharing networks, and intergenerational programs all reflect Japanese principles while building social resilience and environmental sustainability (World Economic Forum, 2019; BBC, 2024).

However, implementing Japanese principles in Western contexts requires careful attention to cultural adaptation. The social harmony emphasized in *wa* might need to be balanced with Western values of individual expression and diversity ([Onlinescientificresearch.com](https://onlinescientificresearch.com), 2025; Frontiers in Psychology, 2024). The collective perseverance of *ganbaru* might require modification to ensure it doesn't suppress healthy help-seeking or individual needs (Indian Express, 2025; Child Research Network, 2018).

5. Conclusion

The Japanese model reveals that a good life is not an achievement to chase but a rhythm to align with—a dynamic balance of giving and receiving, growing and accepting, striving and resting that honors both individual flourishing and collective well-being (Oishya, 2025; Big Think, 2023). Unlike approaches that treat happiness as a destination reached through accumulating experiences or achievements, Japanese wisdom shows how contentment emerges from right relationship with the present moment, other people, and the natural world (Mind Forest AI, 2025; Uchitani, 2020).

Professor Besser's research enriches this understanding by highlighting how psychological richness—through novelty, complexity, and cognitive engagement—adds essential depth to traditional concepts of happiness and meaning. Her insight that "the best approach is to create a balanced life that accommodates happiness, meaning, and psychological richness in a way that suits our individual needs and aspirations" (Besser, 2025, p. 3) provides a framework that honors both individual differences and universal human needs for growth, connection, and purpose.

This integration across life domains offers particular relevance for modern challenges characterized by fragmentation, overwhelm, and disconnection. Rather than adding more practices to already busy lives, Japanese principles demonstrate how activities like eating, working, relating, and growing can be transformed into expressions of deeper values and sources of sustainable well-being (News Medical, 2025; [Onlinescientificresearch.com](https://onlinescientificresearch.com), 2025).

The research evidence supporting Japanese approaches to longevity, stress management, community building, and organizational effectiveness suggests these are not merely cultural curiosities but practical frameworks with broad applicability (Nakagawa et al., 2022; Li et al., 2009; Blue Zones, 2024). However, successful adaptation requires understanding the underlying principles rather than simply copying surface practices ([Onlinescientificresearch.com](https://onlinescientificresearch.com), 2025; Frontiers in Psychology, 2024).

Perhaps most importantly, Japanese philosophy offers a vision of human flourishing that includes both individual fulfillment and collective thriving, both personal growth and environmental sustainability. In an era of global challenges requiring both individual behavior change

and systemic transformation, this integrated approach provides hope that we need not choose between personal well-being and social responsibility (World Economic Forum, 2019; News Medical, 2025).

As Besser notes, "A good life isn't about a single measure of success—it's about experiencing fulfillment in all areas of life... Each aspect can be rewarding in different ways" (Besser, 2025, p. 9). The path forward involves experimentation rather than wholesale adoption—choosing one principle that resonates most strongly, practicing it with patience and consistency, then gradually integrating others as understanding deepens and habits stabilize. Whether beginning with the mindful eating of *hara hachi bu*, the purposeful service of *ikigai*, the acceptance of *wabi-sabi*, or the continuous improvement of *kaizen*, each principle opens doorways to the others, creating possibilities for a more harmonious and sustainable way of living (Marlee, 2024; TechTarget, 2021; Clear, 2018).

Bibliography

- Apeejay News. (2025, February 2). Yaturi: A timeless philosophy for personal growth and well-being. *Apeejay News*. <https://apeejay.news/yaturi-a-timeless-philosophy-for-personal-growth-and-well-being/>
- BBC. (2024, February 26). Mottainai: In Japan, creativity is key to a no-waste ideal. *BBC Travel*. <https://www.bbc.com/travel/article/20240125-mottainai-in-japan-creativity-is-key-to-a-no-waste-ideal>
- Besser, L. (2025, February 25). The good life debate: Pursuit of ikigai or life of wonder and adventure [Webinar transcript]. *Mizuho India Japan Study Centre*.
- Big Think. (2023, April 26). Nagomi: The Japanese philosophy of finding balance in a turbulent life. *Big Think*. <https://bigthink.com/the-learning-curve/nagomi/>
- Blue Zones. (2024, August 5). Okinawa, Japan. *Blue Zones*. <https://www.bluezones.com/explorations/okinawa-japan/>
- Bokksu. (2024, May 15). Mottainai concept: Japan's path to sustainability and respect. *Bokksu*. <https://www.bokksu.com/blogs/news/mottainai-concept-japans-path-to-sustainability-and-respect>
- Businessmap. (2025, July 9). Kaizen: The Toyota way to continuous improvement. *Businessmap*. <https://businessmap.io/lean-management/improvement/what-is-kaizen>
- CAC. (n.d.). Zen mind, beginner's mind. *Center for Action and Contemplation*. <https://cac.org/daily-meditations/zen-mind-beginners-mind-2023-03-22/>
- Child Research Network. (2018, August 30). Ganbari or grit? First graders' views in Japan and the United States. *Child Research Network*. https://www.childresearch.net/papers/multi/2018_01.html
- Clark's Healthcare. (2025, July 8). Prevent overeating with the Japanese practice of hara hachi bu. *Clark's Healthcare*. <https://www.clarkshealthcare.com/how-to-stop-overeating-discover-the-japanese-secret-of-hara-hachi-bu/>
- Clear, J. (2018, June 11). This Zen concept will help you stop being a slave to old beliefs. *James Clear*. <https://jamesclear.com/shoshin>
- Cleveland Clinic. (2023, December 5). Forest bathing: What it is and its potential benefits. *Cleveland Clinic*. <https://health.clevelandclinic.org/why-forest-therapy-can-be-good-for-your-body-and-mind>
- Economic Times. (2025, May 18). 'Hara hachi bu': Japanese have been following this 80% rule for 300 years to live longer. *The Economic Times*. <https://economictimes.com/news/new-updates/hara-hachi-bu-japanese-have-been-following-this-80-rule-for-300-years-to-live-longer/articleshow/121260416.cms>
- Food and Nutrition Journal. (2025, August 24). Blue zone dietary patterns, telomere length maintenance, and longevity: A critical review. *Food and Nutrition Journal*. <https://www.foodandnutritionjournal.org/volume13number2/blue-zone-dietary-patterns-telomere-length-maintenance-and-longevity-a-critical-review/>
- Forest Holidays. (2017, July 11). Forest bathing benefits | Sooth your body & mind. *Forest Holidays*. <https://www.forestholidays.co.uk/things-to-do/forest-bathing/benefits/>
- Frontiers in Psychology. (2024, September 12). Relationship between individualism/collectivism and mental health: A meta-analysis across 20 countries. *Frontiers in Psychology*. <https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1448461/full>

- Goju Karate. (2023, March 16). Ganbaru — Steadfast determination 頑張る. *Goju Karate*. <https://www.gojukarate.com/ganbaru-steadfast-determination/>
- Healthline. (2025, July 24). Forest bathing: Embracing the practice and research-driven benefits. *Healthline*. <https://www.healthline.com/health/forest-bathing>
- Healthshots. (2025, February 24). Hara hachi bu: Benefits and side effects. *Healthshots*. <https://www.healthshots.com/healthy-eating/nutrition/hara-hachi-bu/>
- Indian Express. (2024, January 11). Say bye to burnout with the Japanese concept of Shinrin-yoku. *The Indian Express*. <https://indianexpress.com/article/lifestyle/japanese-concept-shinrin-yoku-burnout-9100172/>
- Indian Express. (2025, May 14). What is the Japanese concept of Yutori? *The Indian Express*. <https://indianexpress.com/article/lifestyle/japanese-concept-yutori-avoid-burnout-balance-work-self-care-expert-9952007/>
- Indian Express. (2025, July 27). What is Gambarimasu? *The Indian Express*. <https://indianexpress.com/article/lifestyle/japanese-concept-gambarimasu-teaches-to-do-best-let-go-of-rest-9869810/>
- Japan Forward. (2025, February 6). Itadakimasu: What is well-being in Japanese spirituality? *Japan Forward*. <https://japan-forward.com/itadakimasu-what-is-well-being-in-japanese-spirituality/>
- Kaizen Institute. (2024, November 12). Understanding continuous improvement. *Kaizen Institute*. <https://kaizen.com/insights/continuous-improvement-operational-excellence/>
- Kaizen Institute. (2025, May 3). Gemba and its meaning – The heart of lean management. *Kaizen Institute*. <https://kaizen.com/insights/gemba-meaning-lean-management/>
- Kikkoman. (2025, March 27). What is Japan's secret to keeping obesity down and life expectancy up? *Kikkoman*. <https://www.kikkoman.com/en/cookbook/feature/nutrition01.html>
- Kinboru. (2025, August 18). Embracing imperfections: The essence of wabi-sabi philosophy. *Kinboru*. <https://kinboru.com/the-beauty-of-imperfection/embracing-imperfections-the-essence-of-wabi-sabi-philosophy>
- Li, Q., Kobayashi, M., Wakayama, Y., Inagaki, H., Katsumata, M., Hirata, Y., Hirata, K., Shimizu, T., Kawada, T., Park, B. J., Ohira, T., Kagawa, T., & Miyazaki, Y. (2009). Effects of forest environment (Shinrin-yoku/Forest bathing) on health promotion and disease prevention. *Public Health*, 127(4), 294-308. <https://pubmed.ncbi.nlm.nih.gov/36328581/>
- Lion's Roar. (2024, October 17). Beginner's mind. *Lion's Roar*. <https://www.lionsroar.com/buddhism/beginners-mind/>
- Marlee. (2024, December 31). The true meaning of Ikigai: Discover joy & purpose in life. *Marlee*. <https://getmarlee.com/blog/what-is-ikigai>
- Medha. (2023, December 18). Teaching with the beginner's mind. *Medha*. <https://medha.org.in/teaching-with-the-beginners-mind/>
- Medindia. (2025, August 21). Washoku: Why Japan's fermented, fiber-rich diet improves longevity. *Medindia*. <https://www.medindia.net/health/diet-and-nutrition/washoku-why-japans-fermented-fiber-rich-diet-improves-longevity.htm>
- Mind Forest AI. (2025, June 11). The psychology of wabi sabi and the beauty in the imperfect. *Mind Forest AI*. <https://mindforest.ai/post/wabi-sabi-imperfect>

- Nakagawa, T., Kabayama, M., Okamura, T., Gondo, Y., Masui, Y., Kato, M., Yasumoto, S., Ishimoto, Y., Inagaki, H., Sugimoto, M., Akagi, Y., Arai, Y., Ishizaki, T., Hirose, N., Itoh, Y., & Kamide, K. (2022). Ikigai and subsequent health and wellbeing among Japanese older adults: Longitudinal cohort study. *Health and Quality of Life Outcomes*, 20(1), 23. <https://pmc.ncbi.nlm.nih.gov/articles/PMC8814687/>
- News Medical. (2025, August 18). Washoku diet: Fermented, fiber-rich, and functional. *News Medical*. <https://www.news-medical.net/health/Washoku-Diet-Fermented-Fiber-Rich-and-Functional.aspx>
- Oishya. (2025, June 7). Introduction to nagomi: Harmony in the Japanese way of life. *Oishya*. <https://oishya.com/journal/introduction-to-nagomi-harmony-in-the-japanese-way-of-life/>
- Omaritani, O. (2023, March 16). 5 teachings from the Japanese wabi-sabi philosophy that can change your life. *Omaritani*. <https://www.omaritani.com/blog/wabi-sabi-philosophy-teachings>
- Onlinescientificresearch.com. (2025). Cultural convergence: Exploring the intersection of positive psychology and Japanese cultural constructs. *Online Scientific Research*. <https://onlinescientificresearch.com/articles/cultural-convergence-exploring-the-intersection-of-positive--psychology-and-japanese-cultural-constructs.pdf>
- PMC. (2022, October 31). Effects of forest environment (Shinrin-yoku/Forest bathing) on health promotion and disease prevention: A systematic review. *PMC*. <https://pmc.ncbi.nlm.nih.gov/articles/PMC9665958/>
- Positive Psychology. (2025, May 12). The philosophy of ikigai: 3 examples about finding purpose. *Positive Psychology*. <https://positivepsychology.com/ikigai/>
- Psychology Today. (2012, August 12). Positive psychology and Japan. *Psychology Today*. <https://www.psychologytoday.com/us/blog/the-good-life/201208/positive-psychology-and-japan>
- Rostone Opex. (2022, December 18). What is Ikigai and how can Ikigai improve your life? *Rostone Opex*. <https://www.rostoneopex.com/blog/what-is-ikigai-and-how-can-ikigai-improve-your-life>
- See How You Eat. (2025, May 27). Hara hachi bu benefits & mindful eating origins. *See How You Eat*. <https://seehowyoueat.com/mindful-eating/hara-hachi-bu/>
- Siegfried Blog. (2023, April 20). Wabi-sabi: Accepting our imperfections. *Siegfried Blog*. <https://blog.siegfriedgroup.com/wabi-sabi/>
- Stanford Encyclopedia of Philosophy. (2019, April 4). Japanese philosophy. *Stanford Encyclopedia of Philosophy*. <https://plato.stanford.edu/entries/japanese-philosophy/>
- StudySmarter. (2024, October 29). Japanese philosophy: Zen, wabi-sabi, bushido. *StudySmarter*. <https://www.studysmarter.co.uk/explanations/philosophy/eastern-philosophy/japanese-philosophy/>
- TechTarget. (2021, May 12). What is kaizen (continuous improvement)? *TechTarget*. <https://www.techtarget.com/searcherp/definition/kaizen-or-continuous-improvement>
- The Times of India. (2025, February 26). Hara hachi bu: This Japanese eating habit can promote weight loss and digestion. *The Times of India*. <https://timesofindia.indiatimes.com/life-style/health-fitness/weight-loss/hara-hachi-bu-this-japanese-eating-habit-can-promote-weight-loss-and-digestion/articleshow/118600033.cms>

- Times Now News. (2025, May 16). What's Yutori, the Japanese concept to avoid burnout and keep your mental health regulated. *Times Now News*. <https://www.timesnownews.com/health/whats-yutori-the-japanese-concept-to-avoid-burnout-and-keep-your-mental-health-regulated-article-151659862>
- ToolsHero. (2024, August 14). Gemba kaizen explained: Meaning and theory. *ToolsHero*. <https://www.toolshero.com/quality-management/gemba-kaizen/>
- Uchitani, A. (2020, September 10). WA - the Japanese art of harmony. *Azumi Uchitani*. <https://www.azumiuchitani.com/wa-the-art-of-harmony/>
- University of Pennsylvania. (2023, August 3). A review of the psychological research on ikigai. *University of Pennsylvania Repository*. <https://repository.upenn.edu/entities/publication/5c56f1e9-666e-45ec-a041-73df838ad754>
- Virtuzone. (2024, April 22). Kaizen: The Japanese business philosophy. *Virtuzone*. <https://virtuzone.com/blog/kaizen/>
- Wabi Sabi JP. (2024, June 21). Mottainai: The Japanese philosophy of gratitude and sustainability. *Wabi Sabi JP*. <https://wabisabi-jp.com/blogs/wabi-sabi-journal/mottainai>
- World Economic Forum. (2019, August 2). The Japanese have a word to help them be less wasteful – 'mottainai'. *World Economic Forum*. <https://www.weforum.org/stories/2019/08/the-japanese-have-a-word-to-help-them-be-less-wasteful-mottainai/>
- World Economic Forum. (2024, October 1). How Japan is healing from its overwork crisis through innovation. *World Economic Forum*. <https://www.weforum.org/stories/2024/10/japan-karoshi-overwork-crisis-innovation/>



भारतीय प्रबंध संस्थान बेंगलूर
INDIAN INSTITUTE OF MANAGEMENT
BANGALORE

MIJSC

Mizuho India Japan Study Centre

Bannerghatta Road, Bengaluru. Karnataka, India. 560076

Contact: mijsc@iimb.ac.in

